ROLLING FORWARD:

A BICYCLE IMPLEMENTATION PLAN FOR MUNCIE, IN

A CREATIVE PROJECT

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BY

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Abstract

CREATIVE PROJECT: Rolling Forward: A Bicycle Implementation Plan for Muncie, Indiana

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It is observed that communities invest significant time, dollars, and public trust in creating bicycle master plans and complete street policies without any systems in place to ensure that plans are implemented and policies are turned into practices. This paper explores bicycle infrastructure implementation methods through a review of relevant documents and a study of implementation systems in Chicago, Illinois; Seattle, Washington; Louisville, Kentucky; and Bloomington, Indiana. This analysis of best practices results in a recommended approach to bike plan implementation in Muncie, Indiana, as well as a structured methodology for the creation of the *Muncie Bike Implementation Plan 2017 – 2021*—a bicycle infrastructure implementation plan created by the author in concert with this paper.

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Introduction

Background: Why Plan for Bicycles?

The bicycle has experienced an enormous resurgence in popularity as a planning and community development tool in recent years—and for good reason. Catching onto the economic, environmental, and social impacts that bicycle infrastructure can have on a community, cities across the nation are embracing the development of bicycle infrastructure networks as a one of the most diverse and cost-effective planning tools available.

Cities like Pittsburgh, Pennsylvania; Cleveland, Ohio; and Detroit, Michigan that are facing rapid declines in manufacturing, jobs and population are looking towards bike infrastructure as a tool for retaining youth, attracting young professionals and families, and growing their tax base. Cities experiencing rapid growth are developing bikeway networks in order to combat congestion and increase the quality of life for residents. From local hospital foundations to heavy hitters like the Robert Wood Johnson Foundation, public health groups are approaching bicycle networks as the latest tool for fighting epidemics like obesity, heart disease, and diabetes.[1] Even anthropologists are following suit—devoting entire volumes to the bicycle's impact on the social and cultural health of our cities.[2]

For municipal governments, however, the most compelling impact of planning for bicycles is economic. For example, after the completion of phase one of the Indianapolis Cultural Trail in 2008, the assessed values of properties within a block of the trail increased 148% over

[1] James Longhurst, *Bike Battles: A History of Sharing the American Road* (Seattle: University of Washington Press, 2015) 233; Robert Wood Johnson Foundation, accessed July 1, 2017, https://www.rwjf.org/.
[2] Luis A. Vivanco, *Reconsidering the Bicycle: an Anthropological Perspective on a New (old) Thing* (New York: Routledge, 2013).

the next six years—over $1 billion in growth.[3] Abandoned storefronts became home to new businesses, neighborhoods fighting commercial foreclosure became areas of investment, and business owners reported a dramatic growth in sales and hiring.[4] While the Cultural Trail clocks in as one of the most expensive bicycle infrastructure projects at nearly $8 million per mile ($63 million total),[5] the entire trail project cost about the same amount as building one mile of urban freeway ($60 million, on average).[6]

However, bicycle infrastructure costing even a fraction of that amount can have a massive impact. When Portland, Oregon was named a Platinum Level Bicycle Friendly Community by the League of American Bicyclists in 2008, the estimated replacement value of the city's *entire* bicycle network was $60 million—again, around the cost of one mile of urban freeway.[7] While this cost may seem nominal for a city-wide transportation system, it was enough to establish Portland and the most bicycle friendly major city in the nation—and with it a slew of other major benefits. City planners calculated the total value added to the Portland economy from the bicycle industry alone (parts manufacturing, retail, mechanics, etc.) to be $133.7 million annually.[8] Add in the rest of the positive externalities of Portland's bike network—raised property values, amenity incentives for young families and new firms, decreased wear on urban roadways—and the return on investment expanded a hundredfold.

However, while city officials nationwide are preaching the importance of developing bikeway networks, our transportation budgets are telling a different story. Today, less than 1% of

[3] Jessica Majors and Sue Burow, *Assessment of the Impact of the Indianapolis Cultural Trail: A Legacy of Gene and Marilyn Glick* (Indianapolis, IN: Indiana University Public Policy Institute, 2015) 25.
[4] Ibid, 32.
[5] Ibid, 3.
[6] Elly Blue, *Bikenomics: How Bicycling Can save the Economy* (Portland, OR: Microcosm Publishing, 2016), 39.
[7] Ibid, 39.
[8] Mikkel Ibsen and Tyler Bump, *The Economic Impact of the Bicycle Industry in Portland*. (Portland, OR: City of Portland Bureau of Planning and Sustainability, 2015) 27.

transportation infrastructure spending nationwide is dedicated to bicycle related projects.[9] Should this spending gap continue, our nation runs the risk of repeating the same mistake made during the last bike-boom of the 1970s—not matching public demand with appropriate public infrastructure.[10] While the bike-boom of the 1970s was significant—adult bicycle sales today are only just beginning to catch up with sales rates from the 70s[11]—the failure to meet that boom with appropriate planning and investment was ultimately catastrophic. As a result, our towns and cities never fully experienced the social, environmental, and economic impacts of bikeway networks—and everything from sales to ridership levels fell. Worst of all, the failure to invest in appropriate infrastructure led to more deaths on the road—traffic fatality rate for bicyclists is worse today than it was in the 1970s and 80s.[12]

Today, we are faced with the perfect opportunity to change the way our nation's cities and streets function. Much of our national roadway infrastructure is reaching the end of its shelf life just as the Highway Trust Fund, once healthily fueled by gasoline taxes, is nearing depletion.[13] Local and urban roads today typically source more than 80% of their funding from municipal general funds—meaning *all* residents, not just the ones buying gasoline, are investing in our streets.[14] In fact, some studies show that cyclists who don't own cars are *overinvesting* in our streets by an average of $250 annually, while the average driver is *underpaying* a similar

[9] Blue, *Bikenomics,* 13.
[10] James Longhurst, *Bike Battles: A History of Sharing the American Road* (Seattle: University of Washington Press, 2015) 235.
[11] Longhurst, *Bike Battles,* 233; "Industry Overview 2015," *National Bicycle Dealers Association*, 2015. http://nbda.com/articles/industry-overview-2015-pg34.htm.
[12] *Traffic Safety Facts 2015 Data* (Washington DC: National Highway Traffic Safety Administration, 2017) 2; *Traffic Safety Facts 1996: A Compilation of Motor Vehicle Crash Data from the Fatality Analysis Reporting System and the General Estimates System* (Washington DC: National Highway Traffic Safety Administration, National Center for Statistics and Analysis, 1997) 18.
[13] Longhurst, *Bike Battles,* 238.
[14] Blue, *Bikenomics,* 12.

amount.[15] Cases like the Indianapolis Cultural Trail show us that investing in bicycle infrastructure works—that the return on investment is staggering. National data trends tell us that active demand is burgeoning—that the rate of bicycle commuting nationally grew 51% between 2000 to 2016.[16] This trend is even more apparent in metropolitan centers, with bicycle commuting between 1990 and 2016 increasing by 222% in Indianapolis, 377% in Atlanta, 506% in Chicago, and 870% in Detroit.[17] The data also tells us that latent demand is a massive sleeping giant—that nearly 70% of all trips taken in cars are less than two miles, and can easily be done on bicycle given a space to safely do so.[18] For the first time in our nation's history, the percentage of households without an automobile has started to climb.[19] Our transportation needs and priorities have changed, and if we want our cities to be safe, efficient, and economically viable, then the way we plan must change as well—we must plan for bicycles.

Statement of Problem: The Implementation Gap

In 1971, the State of Oregon passed a groundbreaking law known as the Bike Bill requiring all roadway projects to include bicycle and pedestrian facilities, and additionally require all local governments to spend at least 1 percent of funding received from the state on active transportation improvements.[20] While this law represented a momentous victory for bicycle advocates at the time, it did little to create an actual increase in bicycle infrastructure and

[15] Ibid, 13.
[16] Ken McLeod, *Where We Ride: Analysis of Bicycle Commuting in American Cities*, report, ed. Elizabeth Murphy and Paul Halupka (Washington, DC: League of American Bicyclists, 2016), 2. An annual report on American Community Survey / US Census Bureau bicycle data by the League of American Bicyclists
[17] Ibid, 3-10.
[18] Blue, *Bikenomics,* 14.
[19] Gershgorn, Dave. "After Decades of Decline, No-car Households Are Becoming More Common in the US." Quartz. December 28, 2016. https://qz.com/873704/no-car-households-are-becoming-more-common-in-the-us-after-decades-of-decline/.
[20] Barbara McCann and Suzanne Rynne, *Complete Streets: Best Policy and Implementation Practices* (Chicago, IL: American Planning Association, Planning Advisory Service, 2010), 28.

was largely ignored, unenforced, or forgotten for the next 20 years.[21] This did not change until 1992, when the advocacy organization Bicycle Transportation Alliance sued the City of Portland for noncompliance with the law, forcing the Oregon Department of Transportation (ODOT) and municipal streets departments to change their procedures and practices in order to comply with the law.[22]

The story of the Oregon Bike Bill is not an outlier—the struggle to bridge the gap between governmental promise and governmental action is inherent in any social system. While representatives may work hard to pass a law, they may find the hardest work yet is in enforcing it. When a city planner is drafting a new plan, their greatest fear may be that it simply sits on a shelf, stagnant and unimplemented. While a mayor may build political motivation through an announcement or declaration, the work of carrying out that promise may be less than thankless. It is this gap—between law and enforcement, plan and action, policy and procedure—that lies at the heart of governmental systems. It is the work of translating words into tangible outcomes—of creating change. When these plans and policies are never translated into actionable processes and procedures—or when the parties charged with carryout out those procedures do not communicate or build accountability—these plans and policies will likely never create meaningful outcomes. This is the phenomenon that causes policies to become hollow, public promises to go unfulfilled, and plans to sit on shelves—this is the implementation gap.

Perhaps the greatest force behind this gap can is a lack of cooperation or communication between responsible parties. All too often, the agents responsible for creating policy simply fail to collaborate with the agents responsible for action—or worse, fail to realize that there are no agents responsible for action in the first place. However, certain fields of government practices

[21] Ibid, 46.
[22] Ibid, 28.

are especially prone to this failure by their own nature. While a change in criminal law clearly connotes changes in judicial and law enforcement procedure, other policy changes may not include inherently connected policies or responsible parties. Especially when a policy maker is calling for changes that are new to a community—like building a connected bicycle network—figuring out who needs to do what is often unclear at best. Unfortunately, since the parties that create policy are often not held accountable for this translation into actionable procedures, this vital work is often overlooked.

The implementation gap is a common problem for towns, cities, and public projects across the country—and Muncie, Indiana is no exception. As a graduate assistant working on bicycle planning and advocacy projects for the Delaware Muncie Metropolitan Plan Commission and GIS Departments in 2015 and 2016, the author experienced first-hand the detrimental effects of this implementation gap on bicycle infrastructure projects across the city. While local governments have worked hard to expand the city's on-street bicycle network since the turn of the century, a lack of any clear implementation plan and assigned responsibility has contributed to a disjointed and inefficient process that has left many community members and advocates frustrated.

One example of the implementation gap's effect on bike projects in Muncie can be found in the story of the resurfacing of the ten-block stretch of Elliott Street from 2nd Street to Memorial Drive. In late 2015, the author and Bicycle Pedestrian Advisory Committee chair Kyle Johnson were at a community event when they were approached by a local cyclist, informing them that he had seen resurfacing equipment on Elliott Street on the south side of Muncie earlier that day. As a highly trafficked route for cyclists crossing over the railroad tracks that divide the northern and southern sections of the city—and with excess roadway width—Elliott Street had

long been held by local planners and advocates as a prime candidate for bicycle lanes. However, while the route had been discussed by the Bicycle Pedestrian Advisory Committee members and selected as a part of the future bike network during public engagement events for the 2013-2014 Delaware-Muncie Transportation Plan Update, no system was in place to notify and coordinate this information with the Muncie Streets Department. Johnson immediately called Streets Department Superintendent Duke Campbell, who stated that the current striping plan did not include bicycle lanes, and that striping would be withheld until the striping plan could be updated with adequate bicycle facilities. While the situation was discussed at the following Bicycle Pedestrian Advisory Committee meeting, Campbell (a mandatory committee member as required by city ordinance) was not in attendance and did not send updates.

Table 1 – Muncie Bicycle and Pedestrian Advisory Committee Organization

Administered through: Delaware Muncie Metropolitan Planning Commission (DMMPC)
President: Kyle Johnson, Delaware County GIS Coordinator

Members:
1-4) Appointed by the Mayor of the City of Muncie
5) Appointed by Muncie City Council
6) The Superintendent of the Muncie Parks and Rec.
7) Superintendent of the Muncie Streets Department
8) CEO of Cardinal Greenway, Inc.
9) Metropolitan Planning Organization Director

Institutions to be Represented by Membership:
- Transportation planning
- Health / medical
- Ball State
- Bicycle advocates / clubs
- Economic Development
- Law enforcement
- Community planning
- Trails / greenways

This table depicts the organizational makeup of the Muncie Bicycle and Pedestrian Advisory Committee, as established by city ordinance. *Source: City of Muncie, Indiana.* [23]

[23] *An Ordinance Amending Chapter 74, Division 1 of the Code of Ordinances of the City of Muncie, Indiana.* Ordinance §74 (Muncie, IN: 2015)

Like most public agencies in Muncie, the Streets Department has long suffered from extreme understaffing and grave financial distress. With a managerial staff of three (including Campbell), a labor force of 11 (including part-time and seasonal workers), and an annual operating cost of approximately $35,000 for the entire city-wide repaving program, the Muncie Streets Department operated its resurfacing program on a mere fraction of the staffing and financial resources it needs.[24] Because the Elliott Street striping documents had already been completed, the last-minute request for bike lanes tipped the project over its edge. While the Streets Department has been able to move forward with other projects, Elliott Street has still not been striped at the time of publication of this document, more than a year later.

The story of bicycle infrastructure in Muncie, however, is about more than just underfunded municipal agencies—as the amount of public interest, community enthusiasm, and volunteerism around bicycling in Muncie was observed to be highly energetic and positive during the author's time there from 2015 to 2017. While more contextual details about bicycle planning in Muncie will be provided later in this document (see *Context: Bicycle Planning and Implementation in Muncie*), it is important to note here that bicycle planning in Muncie has been gaining momentum since 2010, and that this momentum has led to the drafting of Muncie's first bicycle master plan (BMP)—currently in its early stages at the time of publication). While the formally adopted bicycle master plan may be an invaluable tool for progressing bicycle infrastructure across the county, it is important to remember that plan formation is only the first step in the process of implementation.

[24] Campbell, Duke. "Implementation Process Interview at Streets Department." Interview by author. June 23, 2017.

According to bicycle planning veteran Peter Lagerwey, "once your plan is completed, there needs to be a strategy for implementing and evaluating the BMP on an on-going basis."[25] However, the implementation strategies necessary for carrying out the very work of the bicycle master plan are the elements Lagerwey says are, "often left to chance without a purposeful strategy for moving forward."[26] Unfortunately, this trend is all too often responsible for causing bicycle master plans to simply sit on the shelf, untouched and unimplemented. While drafting bicycle master plans has become an increasingly popular tool for cities over the past ten years, many of these plans have not been accompanied by the appropriate changes in process and assigned responsibility that are necessary for implementing them. Bicycle master plans that have been implemented, according to Lagerwey, stand out as "a handful of outstanding exceptions."[27]

After the extensive amount of time, effort, and public funding needed for creating a bicycle master plan, the stakes for letting a bicycle master plan sit untouched are high and tragic. A best, an unimplemented plan wastes the time, effort, and money invested by the planners, stakeholders, and public—furthermore damaging the trust, cooperation, and momentum built by those entities as well. At worst, an unimplemented plan contributes to an erosion of the purpose of planning, an erosion of the public health, safety, and welfare that the planning field exists to serve. In the case of bicycle planning, the failure to create a strong implementation strategies for a bicycle master plan means that our roadway networks and traffic patterns will continue to grow in ways that are unsafe and unhealthy for all users of the roadway, regardless of their mode of travel. While good plans aims to make our streets safer, healthier, and more viable places—a failure to implement those plans allows the very agencies responsible for the public health,

[25] Peter Lagerwey, *Creating a RoadMap for Producing & Implementing a Bicycle Master Plan* (The National Center for Walking and Biking and Active Living Resource Center, 2009), 5.
[26] Ibid, 5.
[27] Ibid, 3.

safety, and welfare to contribute to the continued degradation of those attributes. This is where the stakes for implementation strategies may be higher than the stakes for planning—while the failure to plan results in a lack of public oversight for public health, safety, and welfare in our streets, the failure to implement plans results in a blatant disregard for public health, safety, and welfare. In short, the seemingly common mistake of not implementing bicycle plans may be more fatal of an error than not creating the plans at all. While this point may sound dramatic, it is perhaps one of the most important and disregarded tenets of planning—especially if the proper public trust and involvement is fostered, failing to implement plans is more damaging to communities than not planning at all.

While bicycle planning in Muncie has been fortunate to experience a rapid increase in momentum over the past years, the plans and proposals put forth in the community are as prone to sitting on the shelf as any. Perhaps especially due to this momentum, creating sound implementation stratigies to ensure progress may be important now more than ever.

The Tool: The Implementation Plan

While creating sound implementation strategies may happen in a myriad of ways, perhaps the most effective and deliberate method is creating an *implementation plan.* Implementation plans can play a very specific and powerful role in the field of bicycle planning. While bicycle master plans or individual project, area, or corridor plans may state the necessary steps for working towards a vision of the future, the implementation plans provides a very directed roadmap for setting short-term goals, assigning responsibility, and detailing exactly how current internal workflow processes must change. Sometimes referred to as implementation action plans, implementation plans are often *living* documents, frequently referenced, regularly updated to contain project lists, worksheets, and checklists, contact info, and benchmarking

measures. Sometimes, the living nature of the implementation plan may even negate the need for it to undergo a process of jurisdictional approval—letting it exist as more of a tool shared between stakeholders and responsible parties than an officially adopted plan.

Table 2 - Key Elements of a Bicycle Infrastructure Network Implementation Plan

1) Project delivery model (process flow chart)
2) Project lists by year or construction season
3) Assignment of implementation and organizational responsibility

Source: author.

While every implementation plan is different based on the conditions and vision of each community, the author has observed three key elements that are present in most implementation plans that are likely necessary for the plan to succeed. First, the plan should include a project delivery model. This is essentially a flow chart or working outline of the implementation process, detailing each step and charging actors or departments with accountability for specific steps. The second key element is a set of project lists, detailing each project that needs to be completed in throughout each stage of the process, generally broken down by fiscal year or construction season. The third key element is assigning ultimate implementation and organizational responsibility. While all cities must engage in interdepartmental relationships in order to implement a bike plan, having an organizational head with adequate staffing resources is absolutely vital for generating enough organizational capacity to execute such complex projects. The staffing section of an implementation plan is key for establishing that the responsible organizer—generally a bicycle coordinator—should have the authority to hold other department

heads accountable. This section is also extremely important for planning expansions in staffing, and can be a useful tool for calling for an increase in program funding.

On top of these three basic elements, implementation plans generally share a quality of brevity. Most are also quite succinct—considerably shorter than the average bicycle master plan—with less literature focusing on establishing a vision and background. Instead, implementation plans focus more closely on lists, numbers, figures, tables, and maps that may need to be frequently referenced during the implementation process. In this way, the implementation plan is generally seen to be more of a living tool used to guide the build-out process or a network that is already planned or visioned.

The planning process may be considerably different for an implementation plan as well. While a bicycle master plan is based on a community's needs and vision, requiring extensive public outreach, involvement, and input, an implementation plan should be based on the internal processes, procedures, and tasked assignments necessary to complete the community vision established in the bike master plan. This allows the implementation plan to be written more easily, updated with more frequency, and executed with less cost and involvement. For example, while the 2010 bicycle implementation plan for Louisville, Kentucky required a series of involved meetings and constant collaboration with involved parties and stakeholders, all literature, project lists, caluations, and GIS analysis included in the final document were executed by Louisville Bicycle Coordinator Rolf Eisinger alone, and in a considerably short amount of time.[28] According to Eisinger, the implementation planning process should be swift, straightforward, and replicable, allowing the plan to be more freely updated, edited, or replaced as necessary—including an mandatory annual update.[29] In line with this ethos, Eisinger and other

[28] Eisinger, Rolf. "Intersession Interview, 2016 Indiana Bike Walk Summit." Interview by author. August 30, 2016.
[29] Ibid.

stakeholders decided to use the phrase "Project Updates" in the title of the plan in order to ensure it is used as a short time, annually updated, working document.[30]

While many transportation plans, bike master plans, or project corridor plans include chapters on implementation methods, there may be several advantages to adopting a free-standing implementation plan in addition to these chapters. The first advantage is that it provides a safeguard for plans that may neglect to include adequate implementation measures, or plans with implementation measures that later prove to have shortcomings. Because the implementation plan is able to act as a working document, the ability to update or edit the document as needed in the future allows the implementation process for to be more relevant and flexible. A flexible implementation process may be a necessary component of maintaining project momentum and maximixing efficient utilization of temporary resources and opportunities. Implementation process flexibility is especially important for roadway infrastructure projects that arise from special circumstances such as new grants and funding packages, stormwater and utility projects, or private development. The flexibility of the implementation plan as a document also encourages annual or periodic updating, allowing the document function as a benchmarking and performance measuring tool as well.

The implementation plan may also be used as a tool for unifying the goals of other bicycle planning mechanisms. For cities that find it beneficial to take a mutli-pronged approach to bike network implementation, a free-standing implementation plan can help to unite the fragments of a larger planning effort. The implementation plan can also be housed within a separate document. Chicago, for example, incorporated their implementation plan into the *Complete Streets Chicago Design Guideline* in 2013—creating a regulatory document that dictates engineering and design standards as well as the planning process, project delivery

[30] Ibid.

model, and assigned accountability.[31] This document then serves as both a procedural guidebook and action plan for the implementation of the city's multiple bike master plans, streetscape design guidelines, complete streets policy, and a plethora of local corridor and sub-area plans.[32]

In the end, the primary benefit of the implementation plan is that it creates an complimentary system built on cooperative relationships between agencies. Because the workflow processes and assigned responsibilities established in the plan create clear systems of communication and cooperation between departments that often have different missions and end-goals, this system of relationships may translate well into new projects with varying scopes and goals. For example, while a complete streets policy may sound abstract and difficult to implement to municipal streets department without outside involvement, an established workflow and relationship with planners, advocates, and citizen advisory boards may help such a process become more clear or natural.

While every municipality and public agency must plan for the unique needs and conditions of their communities, a great deal of crossover may be observed when examining the basic framework of the bicycle planning process. Especially as the project delivery and construction processes for local roadway improvements are largely informed by the qualifying demands of state and federal funding programs, the challenges of funding, building, and paying to maintain a bicycle network are increasingly becoming universal. While cities may choose between a diverse array of implementation tools and methods (explored in depth in the *Document Review* section of this paper), the basic challenge of translating a bicycle plan into an implementation process is perhaps more universal.

[31] *Complete Streets Chicago Design Guideline*, (Chicago, IL: Chicago Department of Transportation, 2013)
[32] Ibid.

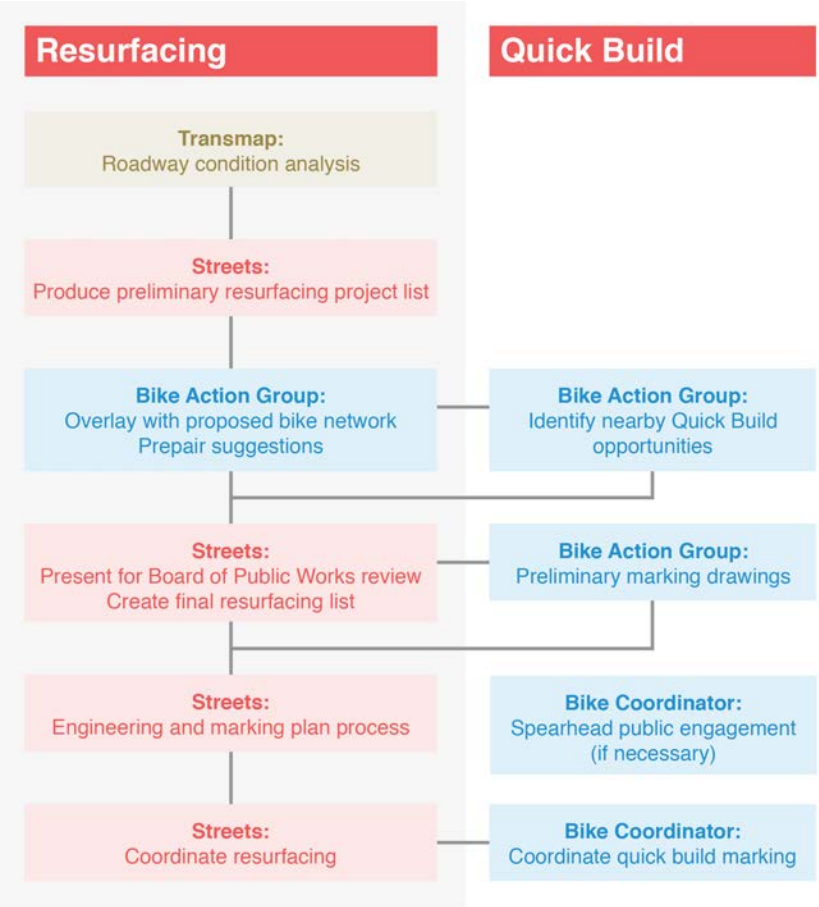
Planning is about shaping public policy. It's about meshing the needs, desires, and vision of the community into a clear direction for the future, with the policy needed to ensure it. Implementating those plans is about changing our workflows, processes, and relationships between responsible parties in order to carry out the policies we create. Especially in an era of planning that is still reeling from decades of automobilie dominance, planning for bicycles can be a daunting tasks. The general public often sees bicycles a toys that impede car traffic, rather than solutions that free up traffic. Local streets departments are often unlikely to get excited about the added work of striping bike lanes if they are struggling to keep up with standard roadway maintenance as it is. And local roadway engineers are often unwilling to consider new treatment typologies that actively seek to narrow the same roadways they widened ten years ago. While the bicycle has become engrained in the planning world, it is not the planner who ends up painting bike lanes. Ironically, it is the parties with the deepest ties to the automobile—municipal streets departments, public works departments, and state departments of transportation—that are ultimately tasked with the final stages of bike plan implementation.[33]

While approaching each infrastructure addition as an individual project may be the natural de facto implementation tactic for most understaffed or underfunded municipalities, it is also the most laborious, expensive, and corrosive to key relationships. When bicycle planners and advocates are seen as special-interest lobbyists, trying to plug their bicycling ideals into every individual roadway project, it is only natural for municpal streets department to see bike infrastructure as something that simply adds to their workload. However, creating a universal project workflow that automatically tucks bike plan implementation into the existing working

[33] It is important to that while many municipal streets departments are still operating on a automobile-dominated paradigm, a growing number of local governments and city-level streets officials have been instrumental in shifting the focus towards active transportation and human-scale street design. For more information on this movement see; National Association of City Transportation Officials, https://nacto.org/.

processes of roadway management may help bike infrastructure to be framed as a normal part of the roadway, and bike planners to be seen as contributing partners in a project.

Table 3 – Example Bike Infrastructure Project Delivery Model for Muncie, IN



The above process flow chart was created by the author in order to visually illustrate the necessary steps to be taken during the implementation process. This type of chart simplifies the workflow process in a way that allows for quick reference by all involved parties. For more details on how this model was developed, see the Project Delivery & Implementation Methods section of the Methodology chapter of this document on page 88. This model can also be found on page 10 of the author's *Muncie Bike Implementation Plan 2017-2021,* included on page 120 in the appendix of this document. *Source: author.*[34]

[34] Richard Tymczyszyn, "Muncie Bike Implementation Plan 2017-2021" Creative Project, Ball State University, 2018, Master of Urban and Regional Planning, 10.

The implementation plan is one way of clearly incorporating bikes into the working processes of the roadway management realm. It's a short-term action plan that translates master planned vision into actionable task lists. It's a procedural tool that outlines the bicycle planner or coordinator's role as a partner in the implementation process, rather than an advocate or activist. It's a tool for creating concise expectations against which to measure future progress.
A repeatable process/system that can be easily updated for different time periods. There's no need for a bike master plan if there's not a process to implement it. There's no need for a complete streets policy if there's not a process to carry out and enforce that policy.
An implementation plan creates that process by outlining actionable steps, assigning responsibility, and creating the oversight measures to ensure its success.

Context: Bicycle Planning in Muncie

Muncie does have a relatively positive history of bicycle planning. In 1993 the non-profit organization Cardinal Greenways Inc. was created in order to purchase 60 miles of former railway corridor through a public partnership.[35] That partnership with the City of Muncie continued through the 1990's and early 2000's with the addition of the White River Greenway project, the two greenway projects resulting in 62 miles of paved trails by 2011.[36] In addition to the greenway system, Muncie is home to a seven-mile, loosely connected network of traditionally striped on-street bike lanes. The Cardinal and White River Greenways, coupled with the limited downtown bike lane network, stand out as the pinnacle achievements of bicycle planning and infrastructure development in Muncie.

[35] "History." Cardinal Greenways. Accessed May 20, 2017. http://cardinalgreenways.org/about-cardinal-greenways/history/.
[36] Ibid.

These facilities, however, were all created through project-based planning efforts rather than de facto implementation of a bicycle master plan. While the end results of these efforts were positively successful, they each required an organized, freestanding effort that focused on each project individually, rather than overall network implementation as a whole. According to interviews with both Johnson and Campbell, the first three miles of bike lanes striped in the downtown were initially conceived by Mayor Dennis Tyler, who personally spearheaded the initiative with the Department of Public Works to have them striped during a forthcoming repaving project in 2013.[37]

While devoted non-profits and proactive mayors are certainly assets to bicycle planning efforts, having these parties act as the primary lead on local bicycle planning projects is undoubtedly an inefficient and inconsistent way to approach bicycle planning as a whole. Moreover, pursuing the construction of individual lengths of bicycle infrastructure without a dedicated and community-driven bicycle masterplan means that the final product may lack sufficient connectivity and remain inconsistent with community needs. In short, the primary issue with a project-based approach is that it is not guaranteed to be a network-based approach.

The secondary issue with a project-based approach is that it requires an endless duplication of efforts. Each time the mayor's office or a non-profit wish to embark on a new infrastructure development project, it must restart the engagement, fundraising, political negotiation, and engineering process anew—despite the fact that it was just done for a previous project. This approach not only leaves each project vulnerable to political and financial intervention, but also creates a system where pro-bike public officials and advocates must

[37] Johnson, Kyle. "Implementation Process Interview." Interview by author. June 18, 2017.; Campbell, Duke. "Implementation Process Interview at Streets Department." Interview by author. June 23, 2017.

proactively push implementation upon the responsible parties—in some cases overreaching their jurisdictional authority.

Until recently, this is the model—and subsequent resulting condition—that has historically been used for bicycle planning in Muncie. Rather than establishing a master plan and implementation system for a comprehensive bicycle network, the city embarked upon a series of disconnected projects—individually repeating the planning process for each, and assigning placing implementation responsibility on a volunteer basis.

In an effort to formalize bicycle planning and advocacy in Muncie, Mayor Tyler called for the formation of a Bicycle Pedestrian Advisory Committee (BPAC) and an education and outreach organization called Bike Muncie in 2014, appointing Delaware County GIS Coordinator Kyle Johnson as chair.[38] The committee's first task was to draft and have adopted an ordinance amendment establishing some basic protections for cyclists and solidifying the role of the committee as officially charged with bicycle project, plan, and program development under the Metropolitan Plan Commission (MPO), accomplishing that goal in 2015.[39] This act of appointing a board to act with official capacity was the first and most necessary step taken towards transitioning from a project-based planning approach to a network-based approach. With a committee in place, the roles and responsibilities necessary for creating bicycle planning systems were empowered to carry legitimacy, with Johnson gaining the jurisdictional authority to spearhead plans and tasks under the MPO.

Under Johnson, the committee made quick strides to advance bicycle planning in Muncie. While the role of bicycles had been briefly pointed out in past plans—such as the *2000 Delaware*

[38] Johnson, Kyle. "Implementation Process Interview." Interview by author. June 18, 2017.
[39] *An Ordinance Amending Chapter 74, Division 1 of the Code of Ordinances of the City of Muncie, Indiana.* Ordinance §74 (Muncie, IN: 2015)

County Comprehensive Plan and the *2013-2040 Delaware-Muncie Transportation Plan Update*—neither of these documents resulted in a comprehensive bicycle network or pipeline of projects, nor did they highlight steps or responsible parties for implementation.[40] After the creation of the committee and appointment of an official chair, however, a new wave of bicycle planning efforts that are network and implementation focused began. In 2016 alone, Ball State University initiated a campus bike master plan process, Delaware County started a county-wide bicycle master plan process, and a bike-share feasibility study was subcontracted through a partnership agreement between the Delaware Muncie Metropolitan Plan Commission and Ball State University. Unlike all past plans that mention bicycles in Muncie, each one of these planning projects focused on creating a comprehensive bicycle network for eventual implementation.

While 2016 marks the start of the transition from a project-based to a network-focused approach to bicycle planning, there is no guarantee that these efforts will result in a clear system for plan implementation. Indeed, without a deliberate effort to create a clear and formalized system for implementation in concert with these plans, the fear of implementation being stalled or neglected is more than reasonable.

Context: Bicycle Project Implementation in Muncie

Perhaps the largest misconception about bike plan implementation is that it is the ultimate responsibility of the Streets Department. As the administrative body charged with maintaining and updating Muncie's roadway network, it is perhaps logical to believe that a bicycle master plan, once completed, can be simply handed to the Streets Department for construction.

[40] *2000 Delaware County Comprehensive Plan,* (Muncie, IN: Delaware Muncie Metropolitan Plan Commission, 2000), 5.5–5.13.
2013-2040 Delaware-Muncie Transportation Plan Update, (Muncie, IN: Delaware Muncie Metropolitan Plan Commission, 2000), 55-61.

However, it is this misconception that may be the most responsible for the poor implementation of bicycle plans universally. Just as fatal as the idea that the role of the proactive planner ends after plan approval, the idea that implementation is the sole responsibility of the Streets Department is perhaps as dangerous as is it common.

While this misconception may not be a driving force restricting progress in Muncie, it has perhaps fueled popular undertones that suggest the streets department has not upheld their end of the bargain. Following the above example of the failure to stripe the Elliott Street bike lanes, the Streets Department is clearly the easiest entity upon which to place blame. Admittedly, the author repeatedly fell prone to the error of blaming the Streets Department for lack of momentum and implementation—that is, until coming to the realization that the streets department was not receiving the necessary support. Faced with a small staff and only a fraction of an adequate operating budget, Muncie's past project-based approach has only served to add more time and expense to the Streets Department's workload, and with generally few resources. For a public department that is largely used to the controlled and systematic processes required of state and federally funded roadway projects, adding bicycle infrastructure projects into the mix with no clear chain of communications, no assigned outside responsibility, and no written process for implementation is a recipe for inaction.

Image 1 – Elliott Street Before Resurfacing. *Source: Google Maps.*[41]

Looking at Elliott Street in 2017, the unknowing observer might wonder why the Streets Department never bothered to finally stripe it. However, looking back on the situation, there was never a real plan for striping bike lanes on Elliott. While past planning efforts had highlighted that Elliott Street should receive bike lanes, and while the Bicycle Pedestrian Advisory Committee considered Elliott as slated for future infrastructure, the real conversation did not start until it was already too late. To be clear, this was not the fault of any party—but the fault of a missing system. Without an agreed-upon and officially adopted network from a master plan, and without a clear plan for efficient implementation, this story may likely occur again.

Another example of the need for a systemic approach to implementation can be seen in the history of the Oakwood Avenue bike lanes. Oakwood Avenue—a half-mile long corridor that provides a popular bicycle route between Ball State University and the closest grocery store—was slated to be repaved and striped during the 2015 construction period. The Bicycle Pedestrian Advisory Committee was still in its early formation stages, and the Streets Department included

[41] "Elliott Street, Muncie, IN," Google Maps, Streetview, August 2013, accessed January 10, 2018, https://www.maps.google.com./maps. Image digitally modified by author for crispness and clarity.

new bike lanes in the Oakwood striping plan without communicating with the new committee.[42] After Oakwood reopened, a slew of cyclists contacted both the new committee and the Streets Department to complain about the bike lane design.[43] Nearly half of the four-foot wide bike lane was consumed by a gutter pan with an abrupt seam. Large corner radii on some of the many curb cuts along the street contributed to extremely long merge areas between auto traffic and the new bike lanes—the longest of which is over 280 feet. Finally, the right turn only lane was placed on the left of the bicycle lane instead of using a prior merge to the right. Not only is this design against federal standards, it is also often responsible for causing right-turning automobiles to hit bicycle thru-traffic—a scenario commonly known as the right hook. As an underfunded department with little state and federal support or training for best practices in bicycle infrastructure design, the Streets Department had accidentally created infrastructure that many local cyclists feel is unsafe. After a conversation between Johnson and Campbell about the design issues on Oakwood, Johnson provided Campbell with a rough sketch and a copy of a page from the Indiana Manual on Uniform Traffic Control Devices (INMUTCD) as guidance for fixing the intersection design flaw.[44] Campbell was receptive to this input, and the intersection was finally updated four months later.[45] The new design, however, includes new flaws—including an angled and abrupt merging zone that is also inconsistent with federal standards and still unsafe.

[42] Johnson, Kyle. Interview. June 18, 2017.
[43] Ibid.; Campbell, Duke. Interview. June 23, 2017.
[44] Johnson, Kyle. Interview. June 18, 2017.
[45] Ibid.

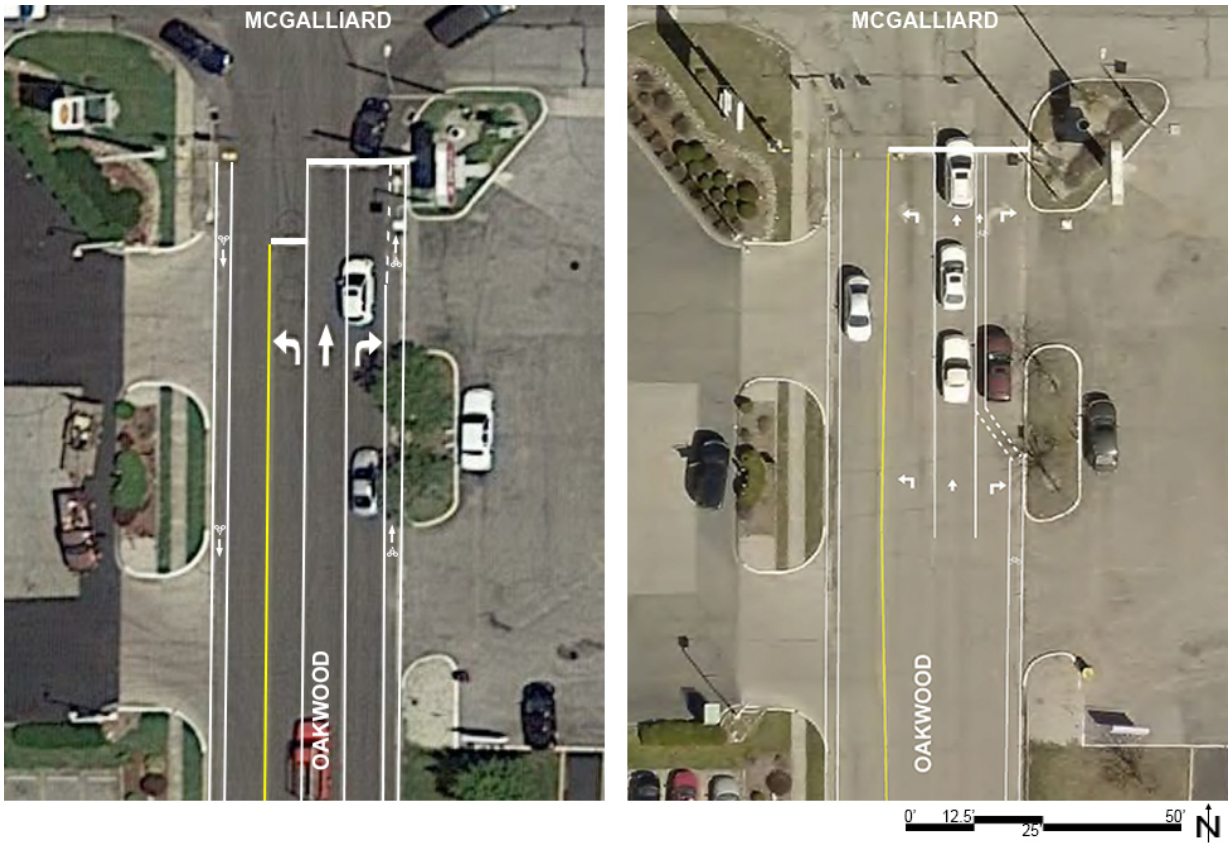


Image 2 – Oakwood Avenue Bike Lane Striping Updates at Intersection with McGalliard Road. The image on the left displays the Muncie Streets Department's original striping and bike lane updates before Johnson's suggested improvements were made. The image on the right was created by Johnson and submitted to Campbell in order to display suggested striping updates. *Sources: Google Maps and Kyle Johnson.*[46]

In separate interviews, the author asked both Johnson and Campbell for their thoughts on how such scenarios could be prevented in the future, and received the same answer from both—timing.[47] Johnson expressed a desire to be informed of projects during the formation of the striping plans so that he can better assist and provide design insight and feedback from the committee.[48] Campbell expressed a desire to know where the committee wants bike

[46] "Oakwood Avenue, Muncie, Indiana," Google Maps, 2016, accessed January 10, 2018, https://www.maps.google.com./maps. Left image. Image digitally modified by the author to more clearly display striping.; Kyle Johnson, Suggested Improvements for Oakwood Intersection, digitally modified image, February, 2016. Right image.
[47] Ibid.; Campbell, Duke. Interview. June 23, 2017.
[48] Johnson, Kyle. Interview. June 18, 2017.

infrastructure, what they want key details of that infrastructure to look like, and early assistance in commutating those details to striping engineers.[49] When asked if a clearly defined network map, workflow, and project pipeline list would meet that desire, both parties answered yes.

What Muncie lacks in public monetary resources, it compensates for with initiative. Cardinal Greenways Inc., the Mayor's Office, the Delaware Muncie Metropolitan Plan Commission, the Bicycle Pedestrian Advisory Committee, Ball State University, the Muncie Arts and Culture Council, Red Tail Nature Conservancy, Mid-Indiana Trails, the Streets Department, and even private businesses have all individually acted as leaders on unique bicycle infrastructure projects, big and small. The will, heart, and political desire for expanding bicycling in Muncie is alive, well, and strong. While this enthusiasm is creating progress to be sure, the lack of any official system for translating these dreams, ideas, and plans into actionable steps towards implementation is holding back much of the city's potential progress at the gate. Repeated processes, fixing mistakes, and the need to start each individual project from scratch have been eroding at what little financial resources are available—and moreover hold the potential to erode important relationships as well. With so much time, effort, and funding going into network development and bicycle master planning, the need to plan for long-term implementation has never been more important.

[49] Campbell, Duke. Interview. June 23, 2017.

Document Review

Translating plans and policies into appropriate systems for successful implementation is a difficult task—but not one that must go without guidance. The purpose of this section is to provide the reader with insight on bicycle plan implementation processes and methods through a careful analysis of relevant documents on the subject. For each of the following four document reviews, the author examined each document's position and arguments. The author then mined from each the key ingredients for successful implementation and other best practices that may be applicable in context of bike plan implementation in Muncie, Indiana.

Creating a RoadMap for Producing & Implementing a Bicycle Master Plan

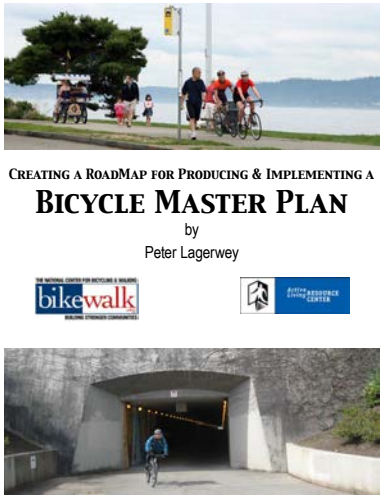


Image 3 – RoadMap Cover. *Source: Peter Lagerwey.* [50]

Understanding the need for bicycle planning, cities and towns across the country have been increasingly turning to the bicycle master plan as a primary tool for creating new bicycle

[50] Peter Lagerwey, *Creating a RoadMap for Producing & Implementing a Bicycle Master Plan* (The National Center for Walking and Biking and Active Living Resource Center, 2009). Document cover image.

infrastructure and moving their city streets forward. However, while drafting bicycle master plans has experienced a dramatic increase in popularity in recent years, the nationwide effectiveness of the bicycle master plan as a tool is still unknown. While a growing trend for bike master planning is certainly contributing to increasing the public and political awareness and implementation potential of bicycle infrastructure networks, focusing on planning alone is simply not enough. There is no such thing as a plan that guarantees its own implementation, and a plan without appropriate processes or staffing resources is likely to do little more than sit on a shelf. Unfortunately, the interdisciplinary, cross-departmental, and often multi-jurisdictional nature of bicycle planning leaves bike master plans especially prone to this risk.

In response to risk of plan stagnation, The National Center for Walking and Biking and Active Living Resource Center published *Creating a RoadMap for Producing & Implementing a Bicycle Master Plan* in 2009 as a guidebook to help municipalities, advocates, and bicycle coordinators better guide their plans through to implementation. Written by veteran bicycle planner and White House recognized "Champion of Change" Peter Lagerwey,[51] the guide provides effective and direct advice for helping bicycle plans avoid stagnation.

The first phase of successful plan implementation, Lagerwey suggests, begins before the bicycle master plan is even written. This crucial step should involve starting a citizen's bicycle advisory committee in order to build consensus on the community's goals for the master plan.[52] This is a vital step for building the necessary momentum, context, and oversight for the rest of the plan process—and is fortunately a step that Muncie has followed quite well. The second

[51] Katherine Gallogly, "Transportation Leaders Championing Innovation Across the Country," National Archives and Records Administration, October 29, 2015, https://obamawhitehouse.archives.gov/blog/2015/10/19/transportation-leaders-championing-innovation-across-country.
[52] Peter Lagerwey, *Creating a RoadMap for Producing & Implementing a Bicycle Master Plan* (The National Center for Walking and Biking and Active Living Resource Center, 2009), 4.

phase occurs during the planning process itself by creating a step-by-step procedure for how the plan will be implemented, and naming the parties or individuals responsible for carrying out each specific step.[53] Once the plan is adopted and is recognized as a legally binding document, this step becomes critical for solidifying roles and responsibility. As Muncie is currently in the process of drafting its first bicycle master plan in 2017, this will become an important step in ensuring later success in maintaining momentum and ensuring implementation.

After the bicycle master plan is implemented, Lagerwey outlines six steps that should be followed as the third and final phase of implementation. The first two steps, Lagerwey states, are also the most important—getting the plan official adopted and immediately implementing the accountability strategies.[54] While an unofficial plan may serve a role in providing direction to a municipality, getting that plan officially adopted is necessary for formalizing and institutionalizing the responsibilities of party involved in the plan.

Step three is perhaps the most specifically applicable to this project—developing an annual work plan.[55] An annual work plan is a way of listing the specific projects you plan on accomplishing that year, and then setting out a process for accomplishing those goals. Different cities do this in different ways, and may have different names for this process. However, whether it is an annual implementation plan, action plan, or updated yearly project list, it is important that there is an officially recognized system for repeating this process every year. Lagerwey suggests the best way to ensure a solidified game plan each year is to make annual work plans a requirement by mandate through the bike master plan.[56] Additionally, Lagerwey emphasizes that

[53] Ibid, 4.
[54] Ibid, 5.
[55] Ibid, 26.
[56] Ibid, 26.

the annual work plan should be considered a living document—a living checklist that is constantly referenced and updated throughout the implementation process.[57]

Table 4 – Lagerwey's Steps Towards Implementation

0.) Precursor Step: Starting a citizen's bicycle advisory committee
1.) Get the Bike Master Plan officially adopted
2.) Immediately begin implementing accountability strategies
3.) Develop an annual work plan
4.) Maintain ongoing public outreach
5.) Collect data and document success
6.) Stay flexible and prepared for new opportunities as they arise

Source: Peter Lagerwey.[58]

The final three steps for implementation are less order-specific, and more opportune by nature—maintaining ongoing public outreach, documenting success, and staying prepared for any opportunities that may arise.[59] While Lagerwey does not spend much time explaining these in detail, the author believes they are an important reminder that plans do not always go according to plan, and that successful implementation processes require constant staffing resources. Maintaining a healthy and transparent relationship with the public is absolutely vital for the successful implementation of any plan, and is impossible to do without a dedicated staff person for coordination. Similarly, data collection and progress tracking are ongoing processes that cannot be managed soundly on an ad-hoc basis, especially when they involve multiple agencies in different jurisdictions. Finally, it is extremely difficult for volunteer coordinators and citizen-led boards to be as nimble and responsive as a full-time staff person—and processes

[57] Ibid, 26.

without an assigned leader are prone to missed opportunities. In this way, Lagerwey's final three steps might not be possible to follow without appropriate staffing resources.

While Lagerwey does not specifically dwell on staffing resources as a necessary element for successful plan implementation, it is difficult to imagine utilizing his methodology without a dedicated staff person acting as lead coordinator. While assigning mandated responsibilities in the bicycle master plan may be a valid tactic for fostering accountability across multiple departments and jurisdictions, it is entirely feasible for such mandated accountability to simply fade away without regular coordination and oversight from a lead coordinator. While Lagerwey may have avoided this point in order to avoid discouraging cities without the financial means to hire a coordinator from abandoning the writing off the planning and implementation processes, the extent and nature of his methodology imply that a staffing a dedicated coordinator is necessary.

Ultimately, Lagerwey believes, most municipalities fail to see their bicycle master plans through to implementation because they simply never establish a process to do so.[60] While the steps Lagerwey establishes are simple, their simplicity suggests that successful plan implementation is more dependent upon accountability and follow through than technical tools and robust resources. For Muncie, this may be a positive sign. While the public sector may be lacking in financial resources, the capacity for building a strong strategy and assigning accountability is certainly not beyond the city's reach. Especially as Muncie's Bicycle Pedestrian Advisory Committee has a strong and dedicated base of citizen-advocates, the city may be well equipped for pursuing Lagerwey's steps. Especially with an established methodology for

[58] Ibid, 4-27.
[59] Ibid, 27.
[60] Ibid, 3.

organizing project workflow and developing annual work plans through this creative project, the committee may be well equipped for following Lagerwey's advice.

Incorporating On-Road Bicycle Networks into Resurfacing Projects

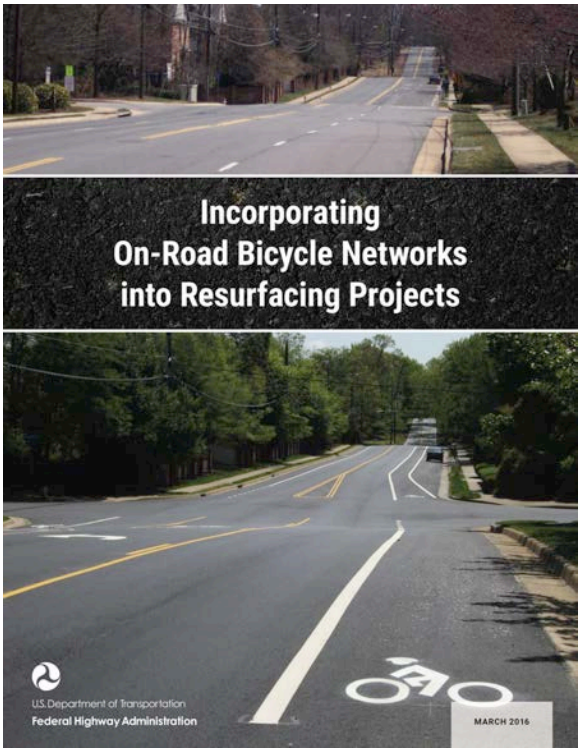


Image 4 – Resurfacing Guide Cover. *Source: FHWA*.[61]

One of the most common, useful, and cost-effective ways of rolling out new road striping and bicycle infrastructure across large portions of a city's roadway network is to coordinate with the regular roadway resurfacing and maintenance programs that are already in place. Because coordination with roadway resurfacing is now such a common practice for incrementally implementing on-street bicycle infrastructure plans, the Federal Highway Administration

[61] *Incorporating On-Road Bicycle Networks into Resurfacing Projects* (Washington DC: U.S. Department of Transportation, Federal Highway Administration, 2016). Document cover image.

released the 2016 report *Incorporating On-Road Bicycle Networks into Resurfacing Projects* to better help municipalities coordinate the process.

The report opens with an argument advocating for using resurfacing projects as a way to create bicycle facilities. The primary advantage of this process is that it's extremely cost-effective, especially when directly compared to the cost of building bicycle infrastructure as standalone projects.[62] While building bicycle infrastructure on a standalone basis generally involves eradicating existing roadway markings and restriping travel lane lines and turn markings, these items are already covered in the cost of roadway resurfacing.[63] This allows the overall cost needed to cover the addition of a bicycle facility to be reduced to only the materials and labor directly necessary for the project. Later projections in the report estimate that while a standalone bike lane striping project costing $83,000 per mile may be reduced to $32,000 per mile through resurfacing coordination.[64] While this cost gap is still eventually paid for with public dollars, the savings here are realized because resurfacing programs are already existing, mandatory, and funded. In terms of public dollars, a large portion of municipal budgets across the country is dedicated to roadway resurfacing programs.[65] By including bicycle infrastructure as a part of this process, these programs can be reoriented to better match community goals.

Perhaps the strongest piece of advice the report provides for the resurfacing coordination process has to do with process clarity and timing. Having a clear process and timeline for incorporating bike infrastructure improvements into resurfacing projects is a vital key to successful coordination.[66] Although resurfacing and restriping a roadway may be routine business for many streets departments, adding in bicycle facilities means that the project will

[62] Ibid, 1.
[63] Ibid, 39.
[64] Ibid, 40-41.
[65] Ibid, 4.
[66] Ibid, 7.

need more time for design, engineering, and proper public outreach.[67] Especially as a stalled or delayed process can add undue additional financial burden on a project budget, having a prescribed methodology for beginning coordination early is key for this process. Fortunately, as pointed out in the guide, nearly every agency responsible for resurfacing already has an official timeline and workflow established for each annual project.[68] Ideally, a strong implementation plan should outline a project delivery method that is closely aligned to the existing resurfacing workflow process in hopes that bicycle facilities may be automatically considered in future resurfacing projects, without duplication of services or a need for excessive urging from an additional agency.[69]

However, the guide also warns that failing to update the resurfacing process to include bicycle facilities may result in conflicting priorities and timelines.[70] Many resurfacing agencies, including Muncie Streets Department, may plan for an entire year of resurfacing projects in one motion and release that list at the beginning of that project year. When an additional agency or organization such as the Mayor's Office or the Bicycle and Pedestrian Advisory Committee examines this list in order to consider the inclusion of bicycle infrastructure improvements, any such requests would generally suggest stepping backwards in the process in order to reengineer the design. This may result in extended deadlines, inflated engineering and staffing costs, a repetition of work by multiple agencies, or the risk of collapsing the project altogether. Worse, this may also hinder cooperation and foster a silo mentality between agencies.

[67] Ibid, 7.
[68] Ibid, 8.
[69] Ibid, 8.
[70] Ibid, 8.

For most communities the conversation about including appropriate bicycle facilities in a resurfacing project comes during the marking design and engineering phase.[71] While this may seem like the natural time to begin the conversation, the report suggests that this is entirely too late.[72] Before this stage, streets departments have typically already done an extensive roadway conditional analysis, prepared preliminary project lists and budget projections, and had these lists finalized through jurisdictional review and approval by the Board of Public Works.[73] Knowing what projects include bicycle infrastructure upgrades, as well as some technical design and budget projections related to those upgrades, can be an extremely important part of the project selection, budgeting, and approval process.[74] While the report does not emphasize this, it is important to note that starting conversation during the design phase of resurfacing especially marks bicycle projects as details that require additional funding and labor. Incorporating bicycle improvements during the initial stages of the resurfacing process, however, may help reframe bicycle infrastructure as an anticipated and regular part of the resurfacing process.

The report additionally argues for flexibility in process and design. While resurfacing projects are generally considered routine and don't require public outreach, changing the nature of the roadway through adding bicycle facilities is a process that often necessitates a public input process, community buy-in, and time.[75] Especially as interrupts the otherwise routine nature of a resurfacing project, remaining flexible in this process is important. Furthermore, developing bicycle facilities may force the city to consider lane diets, road diets, and other treatments that are potentially new to the city or the Streets Department such as separated facilities, two-way

[71] Ibid, 9.
[72] Ibid, 9.
[73] Ibid, 13.
[74] Ibid, 11.
[75] Ibid, 16.

cycle tracks, or delineated buffers. Because of this, the report suggests, close communication between parties is key for allowing innovation and design flexibility.[76]

The findings in this report may be incredibly useful for building a successful implementation process in Muncie. The resurfacing program in Muncie is fairly robust, dependable, and already employs an established process. Furthermore, the current levels of communication between the local Streets Department and Bicycle Pedestrian Advisory Committee is occurring well into the design and engineering phases, and displaying the same associated symptoms outlined in the report.[77] The update resurfacing process encouraged in this report should be incorporated into future practices in Muncie, and has been included in the Project Delivery and Implementation Methods section of the Muncie Bike Implementation Plan (pages 5-10 of the independent document, or pages 115-120 in the appendix of this paper).

[76] Ibid, 16.
[77] Johnson, Kyle. "Interview about Implementation Process." Interview by author. June 18, 2017.

Complete Streets: Best Policy and Implementation Practices

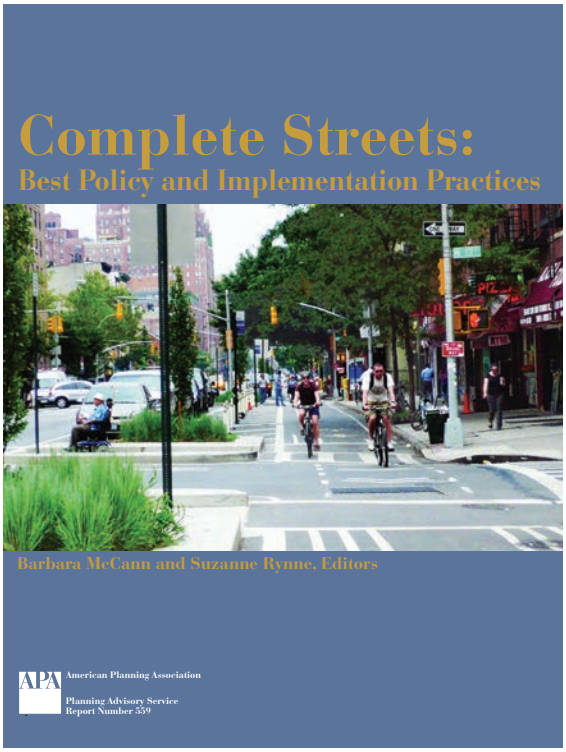


Image 5 – Complete Streets Guide Cover. *Source: Barbara McCann and Suzanne Rynne.* [78]

Along with writing bicycle master plans, complete streets policies are becoming an increasingly popular option for advancing bicycle and pedestrian priorities in cities. While different cities approach this method in varying ways, a complete streets policy is essentially a legally recognized policy that mandates all new roadway and streetscape projects to employ designs that consider the needs of all roadway users, not just the automobile. In short, a complete streets policy is a technical requirement for roadway projects to consider bikes, pedestrians, and transit as well as cars. However, all too often a complete streets policy is approached as an end goal, rather than a means to accomplishing a goal. A complete streets policy that is never

[78] Barbara McCann and Suzanne Rynne, *Complete Streets: Best Policy and Implementation Practices* (Chicago, IL: American Planning Association, Planning Advisory Service, 2010). Document cover image.

translated into practice runs the same risk as a plan without action items—sitting on the shelf. According to the 2010 Planning Advisory Service report *Complete Streets: Best Policy and Implementation Practices*, "it is too easy to adopt a strongly worded complete streets resolution or even a law—and then let it sit, unimplemented."[79]

This report was written in part to address the implementation shortcomings common to complete streets policies. An extremely robust report, editors Suzanne Rynne and Barbara McCann (now the Director of the Office of Policy Development, Strategic Planning, and Performance at USDOT) relied on case studies of thirty cities of all sizes to analyze complete streets policy implementation practices. While much of the report focuses on successfully adopting a policy, a main tenet of the report is specific tools for translating that policy into processes that facilitate implementation. These tools include building goals and steps for implementation, systems like checklists for carrying out those steps, and additional tools like training and performance measures for building accountability and tracking progress.[80]

Part of what makes complete streets policies so varied and diverse is that they can take shape through many different legal processes—from a line in a comprehensive plan to a local ordinance or state law.[81] While each of these carries a different level and nature of legal weight, they also vary in the governing mechanisms that oversee of enforce them.[82] However, despite the nature of the policy itself, no policy can be transformed into process with the appropriate accountability and vision to do so. According to the authors, one way to ensure this is through an inclusive process.[83] "The most successful policy adoption processes have involved community groups that ensure the policy covers all their concerns; the planning and engineering

[79] Ibid, 46.
[80] Ibid, 33-57.
[81] Ibid, 10.
[82] Ibid, 10.
[83] Ibid, 14.

professionals that will be responsible for policy implementation; and the elected officials who can marshal political support for a new approach to road planning and design."[84] This is a concept that can be expanded well beyond a complete streets policy—an inclusive and diverse process is vital in generating buy-in and fostering accountability for any kind of project that needs final implementation.

Similar to Lagerwey and the FHWA resurfacing manual, McCann and Rynne's primary suggestion for successful implementation is to update and edit current processes, and assign accountability.[85] "Taking a complete streets policy from paper to practice is not easy," they state, "but providing some specific implementation steps can help build momentum."[86] One way to do this, as demonstrated in Seattle, Washington, is to clearly state within the policy that all city practices related to roadway improvements must be systematically review and rewritten to include the interests of all roadway users.[87] This, of course, also requires the staffing power and momentum to carry out a wide breadth of process reviews. To help with this, the report suggests naming who is in charge of implementing specific parts of the policy within the policy itself, as well as establishing task forces and commissions to provide accountability.[88] While these steps—creating a process, forming teams, and assigning responsibility—may seem elementary, the report emphasizes their importance based on their impact. "One of the biggest challenges for complete streets advocates is changing business as usual," it states, "new planning processes can help guide planners and engineers through new procedures and ways of thinking."[89]

[84] Ibid, 14.
[85] Ibid, 34.
[86] Ibid, 34.
[87] Ibid, 34.
[88] Ibid, 34.
[89] Ibid, 47.

An additional tool for clearly translating policy into process is the development of checklists. Although simple, checklists can be an easy and effective way of tucking bike projects into current workflows—and many cities reported success directly related to updating process checklists.[90] While the report does admit that checklists may be more useful if they are required to be presented to a bicycle advisory committee after completion, it's important to add that checklists are oftentimes only followed if such an oversight mechanism is in place.[91] Creating a checklist only ensures a complete process if the checklist is used. While creating a complete streets checklist in Muncie may prove to be a successful tool, it still remains vulnerable to the same risk factors as s master plan—without buy-in, cooperation, and accountability, the checklist may simply sit on the shelf.

Cross-department training is also cited as a tool for ensuring implementation and providing the necessary tools for the involved parties to understand and use the new workflow process.[92] Especially as many key stakeholders may be unfamiliar with bicycle planning and complete streets concepts, training may provide an educational role beyond simply process. While training may be useful in the context of Muncie, it may also be more relevant to larger cities where involved department staff greatly outnumbers those in planning and implementation leadership. Because the involved parties in Muncie are generally department heads, incorporating a degree of cross-departmental training into taskforce or project meeting may be a more relevant way to utilize this tool in a context appropriate way.

A final tool for ensuring implementation is the use of performance measures to monitor and quantify progress.[93] While these measures may be as simple as tracking the project miles,

[90] Ibid, 50.
[91] Ibid, 53.
[92] Ibid, 52.
[93] Ibid, 55.

cost, or prioritization levels of projects that go to construction, having a straightforward way to compare progress to stated goals is an important tool.[94] Although the report does not mention this, setting goals through an annual work plan may be one of the most straightforward and easily replicable systems for formalizing goals and benchmarking progress. While the report additionally advocates for several more complex measurement systems like Bicycle Level of Service (BLOS), cumulative corner radii, user counts, and crash data—it is fair to argue that these tools may be geared more for measuring overall success of a bicycle network, and not accurately measure success of implementation.[95] As such, the performance measures in this projects will largely focus on directly measuring implementation success through stated mile, cost, and prioritization goals rather than the more indirect safety or ridership outcomes of the overall bicycle network.

The report closes with general lessons learned and advice from case studies that closely resembles Lagerwey and the FHWA *Resurfacing Guide*. Most notably, it suggests that while bicycle infrastructure is relatively inexpensive compared to other roadway construction projects, delayed processes and post-construction retrofits are far more expensive than project coordination.[96] Echoing FHWA's advice, the report advocated for incorporating bicycle projects into other roadway projects as early as possible in order to keep budgets, timeline, and the workflow in check.[97] While the final chapter focuses specifically on roadway and marking design suggestions, this section largely relies upon an argument for design and process flexibility similar to that advocated by FHWA.[98]

[94] Ibid, 55.
[95] Ibid, 55.
[96] Ibid, 66.
[97] Ibid, 67.
[98] Ibid, 77-99.

Whether or not Muncie moves to adopt a complete streets policy in the future, it is clear that such policies do not have fruitful impacts without clearly defined processes and accountable actors to implement them. While the advice in this report targets communities that struggle to implement complete street policies, the take-home lessons may be applied universally to any public bicycle infrastructure project. For Muncie, the applied best practices are clear—defining new processes, assigning responsibility, and forming teams to foster cooperation and oversight are imperative for moving any plans or policies into the implementation stages.

Quick Builds For Better Streets: A New Project Delivery Model For U.S. Cities

Image 6 – Quick Builds Cover. *Source: Jon Orcutt.* [99]

The quick build model is a relatively new concept that is gaining an incredible amount of traction and popularity in the active transportation planning world. Developed in response to planners and advocates growing increasingly frustrated with slow implementation processes,

[99] Jon Orcutt, *Quick Builds For Better Streets: A New Project Delivery Model For U.S. Cities* (Boulder, CO: PeopleForBikes, Green Lane Project, 2016). Document cover image.

high project expenses, and an institutional resistance to change, the quick build model provides an alternative implementation method designed to sidestep these issues. Quick build projects are interim retrofits of public infrastructure using low-cost materials, installed within one year of initial project planning.[100] Typically led by public agencies, these quick build projects are generally framed as pilot projects—serving an immediate community or safety need, while allowing for later adaptation when opportunities for more permanent construction arises.[101] An example of a quick build project could be a streets department using paint and signage only to turn a regular travel lane into a bike lane buffered with parking, with the expectation that the facility may be converted into a barrier separated facility in the future.

[100] Ibid, 3.
[101] Ibid, 4.

Image 7 - The 300 South protected bike lane in Salt Lake City, Utah was initially installed in 2014 as a quick build, paint-only solution to act as a placeholder for later curb placement. *Source: Steve Griffin.* [102]

Image 8 - The 300 South protected bike lane in Salt Lake City after permanent installation of a protective curb. *Source: Salt Lake City, Utah* [103]

[102] Steve Griffin, 300 South Protected Bike Lane in Paint, digital image, Salt Lake Tribune, September 2, 2014, accessed January 6, 2018, http://archive.sltrib.com/article.php?id=58348049&itype=CMSID.
[103] 300 South Protected Bike Lane in Hardscape, digital image, Salt Lake City - Transportation, 2014, accessed January 6, 2018, http://www.slcgov.com/transportation/300South.

The quick build movement was largely inspired by the growing trend of tactical urbanism—a phenomena where residents and community groups, often without permission, informally install homemade and do-it-yourself (DIY) public infrastructure like protected bicycle lanes, pocket parks, and public seating in key areas of the city. While liability concerns generally force municipal governments to respond by quickly dismantling the installations, these informal treatments are often successful at convey a message of urgency from the community to their municipal leaders. Within the first six months of 2017, community groups in Providence, Wichita, and Omaha informally installed protected bike lanes by gluing toilet plungers to the pavement surface in lieu of flex-posts or other formal traffic delineators—only to have their local governments respond by rapidly installing approved and legal treatments.[104] Although tactical urbanism is a growing and inspirational trend, the quick build model is not necessarily a direct response to specific tactical urban interventions—but rather a governmental interest in institutionalizing that urgency into formal implementation practices.

[104] The plungers were installed on sections of 63rd and Shirley Streets in Omaha, Nebraska; First Street in Wichita, Kansas; and Fountain Street in Providence, Rhode Island.; Michael Anderson, "An Idea That Sticks: Another Plunger-protected Lane Goes Permanent," PeopleForBikes, June 14, 2017, http://www.peopleforbikes.org/blog/entry/an-idea-that-sticks-plunger-protected-bike-lane-goes-permanent-in-providenc.

Image 9 – Citizen-installed toilet plungers acting as protective bollards on Fountain Street in Providence, Rhode Island. *Source: Sandor Bodo.105*

Image 10 – Citizen-installed toilet plungers acting as protective bollards on 63rd and Shirley Streets in Omaha, Nebraska. *Source: Kent Sievers.*[106]

[105] Sandor Bodo, Toilet Plungers on Fountain Street Bike Lane, digital image, Providence Journal, May 11, 2017, accessed January 6, 2018, http://www.providencejournal.com/news/20170511/toilet-plunger-protest-aims-to-help-unclog-providence-bike-lanes.

Especially as the quick build model is such a new and somewhat experimental approach, the national bicycle infrastructure advocacy organization People For Bikes and their assistance branch the Green Lane Project published the 2016 *Quick Builds For Better Streets: A New Project Delivery Model For U.S. Cities* by former New York City Department of Transportation Policy Director and sustainable transportation veteran Jon Orcutt. Before examining the report for content and mining best practices, it is worth mentioning that Orcutt's nationwide reputation and professional credibility in the transportation and bicycle planning fields is an important driver behind the quick build model—helping it to gain recognition as a legitimate and secure project delivery model.

The report methodology largely relies upon input from the seven cities where the quick build model is most heavily employed (Austin, Texas; Chicago, Illinois; Denver, Colorado; Memphis, Tennessee; New York, New York; Pittsburgh, Pennsylvania; San Francisco, California; and Seattle, Washington) in order to comb those experiences for common successful practices. Based on input from the aforementioned cities, Orcutt suggests nine key aspects for employing the quick build implementation method—a team, a system for seizing opportunity, institutionalized urgency, a reliable funding strategy, a contracting plan, and outreach game plan, specialized communications, a maintenance plan, and a measurement system.[107] Perhaps not surprisingly, many of these attributes coincide with suggestions from Lagerwey, McCann and Rynne, and the FHWA *Resurfacing Guide*, although Orcutt provides very detailed examples from each highlighted city.

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[106] Kent Sievers, Toilet Plungers on 63rd and Shirley Streets, digital image, Omaha World-Herald, May 18, 2017, accessed January 6, 2018, http://www.omaha.com/news/metro/advocates-glue-toilet-plungers-onto-omaha-street-to-show-what/article_7e9cff18-8aa4-5884-a6f3-d038a6e5a9c9.html.
[107] Orcutt, *Quick Builds For Better Streets,* 6-19.

Table 5 – A Comparison of Key Ingredients for Bike Infrastructure Implementation

Each of the four documents reviewed in this paper, whether explicitly or implicitly, eventually provide the reader with key ingredients that are necessary for bicycle infrastructure implementation. The author has taken the liberty of interpreting and distilling each set of ingredients into concise lists for comparison.

While there are varying degrees or overlap and specificity between each list, there are several crosscutting ingredients that are of noted in multiple documents. All for documents called for a clear implementation process or workflow, with the FHWA *Resurfacing Guide,* Orcutt, and Lagerwey providing more detail on the need for work plans or project lists. McCann and Rynne, Orcutt, and Lagerwey all call for a dedicated implementation team, while this may arguably be implied in the FHWA *Resurfacing Guide* as well.

Orcutt[108]	McCann and Rynne[109]	Lagerwey[110]	FHWA *Resurfacing Guide*[111]
1.) A team 2.) A system for seizing opportunity 3.) Institutionalized urgency 4.) A reliable funding strategy 5.) A contracting plan 6.) An outreach game plan 7.) Specialized communications 8.) A maintenance plan 9.) A measurement system	1.) A process 2.) A team 3.) *Assigned responsibility*	1.) A team 2.) A process 3.) *Assigned responsibility* 4.) Official plan adoption 5.) Exercising accountability 6.) An annual work plan 7.) Ongoing public outreach 8.) Documenting success 9.) Being prepared for new opportunities	1.) A process and timeline 2.) Coordinated project lists 3.) Clear communication 4.) Flexibility

Orcutt's first two ingredients—creating a team and a system for seizing opportunity—have perhaps the greatest amount of overlap with the additional literature. While Orcutt provides

[108] Ibid, 5.
[109] McCann and Rynne, *Complete Streets: Best Policy and Implementation Practices*, 34.
[110] Peter Lagerwey, *Creating a RoadMap for Producing & Implementing a Bicycle Master Plan*, 4-27.
[111] *Incorporating On-Road Bicycle Networks into Resurfacing Projects*, 1-18.

details into the ways different teams function in their respective cities, the take-away point is clear—however the team is organized, clearly assigned responsibilities and committed point person to spearhead coordination are vital.[112] Similarly, Orcutt's second ingredient, a system for seizing opportunity, is entirely based upon having a team that is cohesive, nimble, and responsive enough to capitalize on the moments of consensus when community groups, local businesses, and city politicians are all in support of a particular project.[113] However, while Orcutt pays no mention to the necessity of hiring a full-time coordinator for such projects, it is difficult to imagine such nimble responsiveness being possible without an assigned leader with adequate staffing resources. It is worth mentioning that all eight cities in studied for the report have either a full-time bicycle or an entire active transportation division dedicated to such projects. While Orcutt's report may simply take this fact for granted, it is an important reminder to cities like Muncie that creating adequate staffing for such projects is an absolutely vital step. Each of the four documents in this document review highlights adequate staffing (or a "team," as Orcutt refers to it[114]) is the primary ingredient needed for successful implementation. Furthermore, as is demonstrated in the case studies section of this document, the cities of Chicago, Illinois; Seattle, Washington; Louisville, Kentucky; Bloomington, Indiana; and Urbana, Illinois all recognize the creation of adequate staffing as a necessary step for bicycle infrastructure implementation.

Orcutt's third and most interesting ingredient is institutional urgency. By self-imposing project deadlines such as before winter or before students move back for fall, Orcutt argues, a level of excitement, challenge, and momentum that is often not present in municipal projects may create more responsive and cooperative partnerships and naturally streamline

[112] Orcutt, *Quick Builds For Better Streets*, 7.
[113] Ibid, 7.
[114] Ibid, 5.

communication timeframes.[115] As an example, after Seattle Mayor Ed Murray announced that the city would plan and install a protect bike lane before the coming fall, the involved implementation teams managed to complete the entire project in just under four months—a timeline that would have been unthinkable without self-imposed urgency.[116] While accomplishing a project very quickly may be an added benefit of this step, Orcutt's main goal more accurately appears to be continued momentum and efficient coordination. Especially because delays and slower public processes can have such a negative impact on the wider community's support of a project, building a degree of institutionalized urgency into Muncie's project delivery model may be an effective tool for regaining public approval and community momentum. Timing quick build projects to coincide with nearby or adjacent resurfacing projects may provide an especially fitting opportunity for institutionalized urgency by increasing the number of project miles within an already establish seasonal timeline.

The fourth ingredient to a successful quick build process Orcutt highlights is a reliable funding strategy. While a lack of funding is the usual reason for municipal governments to dismiss innovative public projects like developing bicycle infrastructure, many cities have successfully implemented extensive bikeway networks through quick build processes that were funded locally.[117] According to Orcutt, state and federal funding structures are often too slow, bureaucratic, and bogged down with detail requirements to be able to fund a quick build style project.[118] In response to this, the case cities have turned to using standing budget line items, bond measures, coordinating into Tax Increment Financing (TIF) districts, philanthropic funding, revenue from privately contracted bike share systems, and even a volunteer labor force (in the

[115] Ibid, 9.
[116] Ibid, 7.
[117] Ibid, 11.
[118] Ibid, 11.

case of Memphis, Tennessee only) to fuel their quick build projects.[119] While it is entirely possible for Muncie to explore utilize such funding options for quick build implementation projects, it may also be an appropriate use of the Congestion Mitigation and Air Quality (CMAQ) funds that Delaware County receives from the Federal Highway Administration and has so far been unable to spend. While there may be apprehension for using CMAQ funds for building actual infrastructure, Chicago has been using CMAQ dollars for all the design and engineering work for quick build projects, and New York City uses CMAQ money exclusively for quick builds.[120] It is also important to note here that none of the above funding options are easily obtainable without constant coordination and centralized management usually provided by an appointed coordinator.

Orcutt's next five ingredients involve building team-managed game plans for contracting, public outreach, cross-agency communications, and ongoing maintenance.[121] While each one of the plans should be drafted deliberately and independently, Orcutt highlights two themes that must be present in each—flexibility and management by a responsive team.[122] The fast and exciting pace of quick build project necessitates on-going relationships with both on-call contractors and in-house teams for contracting and maintenance, a method for engaging in constant and responsive outreach, and interdepartmental relationships to maintain streamlined communications.[123] While Orcutt highlights that a deliberately drafted plan is a necessary component for each of these needs, the greater necessity is a strong team with the staffing capacity to follow through with each goal. Although writing plans for maintaining interagency

[119] Ibid, 11.
[120] Ibid, 11.
[121] Ibid, 12-17.
[122] Ibid, 12-17.
[123] Ibid, 12-17.

relationships and public outreach are important organizational steps, they may be rendered useless if there is not a staffing or organizational capacity to follow through.

The final necessary ingredient for successful quick build projects closely resembles best practices from other literature—measuring performance and progress. While each municipality has different priorities for measuring performance, Orcutt stresses that all measurements need to be frequent and methodical.[124] Creating simple systems to regularly track progress should be built into the implementation processes finally established in Muncie.

Ultimately, the quick build method has the potential to be a powerful tool for effectively rolling out projects from the bike master plan, while maintaining community momentum and project priorities. However, while not specifically mentioned by in the report, the nature of the methodology reveals that quick build projects may be incredibly demanding of staff time and resources. Although the report glosses over the fact that not all cities have the standing human resource power to initiate such committing projects, the depth of the necessary project ingredients imply that at least a full-time committed coordinator is needed.

Additionally, while the report only briefly mentions the benefits of coordinating quick build projects with other on-going roadway construction, this is a concept that could prove to be extremely useful in Muncie's context by borrowing benefits from both approaches. An example of this combined approach is continuing bike lane striping on a stretch of roadway past what is being covered in a resurfacing project, or coordinating to have shared lane markings painted on a and adjacent roadway during a resurfacing project. Especially since Muncie may not have the financial capacity to hire adequate staffing to complete an extensive list of quick build projects each year, this combined approach may also the city's most effective way of implementing projects that do not coincide with regular roadway resurfacing. Because of this, elements and

[124] Ibid, 17.

best practices from all above-mentioned methodologies will be blended into a context appropriate plan.

Case Studies

Perhaps the most relevant way to explore best practices in bike plan implementation is to examine the methods and approaches taken by cities with a positive history of bike network development. After exploring the implementation processes and histories of bike planning and development for many cities across the United States, the author selected the following four cities for examination based upon a combination of three points of consideration; the city's success in bike plan implementation, the types of implementation methods used, or the city's contextual relevance to Muncie, Indiana. The resulting case study covers a large variety of implementation methods and approaches, as well as sizes and types of cities. For each city, the author explores the recent history of bicycle planning and the implementation methods employed, analyzing each for best practices and lessons learned.

Chicago, Illinois

Chicago was selected for a case study in this project because of the wide diversity of implementation tactics employed by the city, as well as the ambitious scale at which the methods are used. While Chicago's size offers a difficult comparison to Muncie, it remains an appropriate starting point for discussing implementation methods because they have employed a wide array of implementation methods that we may examine. Perhaps due to their robust staffing capacity, Chicago has rolled out multiple bicycle master plans and short-term action plans, and monitors progress towards those plan goals. They have an incredibly successful complete streets policy complete with training, project delivery audits and checklists, a compliance committee, and a

robust design manual that include implementation process guidelines. The city also closely coordinates bicycle projects with their resurfacing program through their complete streets processes, and has also implemented some ambitious quick build projects. Needless to say, Chicago has taken shaping implementation policy quite seriously, and their quickly growing reputation as a world-class bicycle city suggests that this has paid off.

When Chicago adopted their *Bike 2000 Plan* in 1992, the document called for 300 miles of bike lanes, but did not lay out a network suggesting placement, nor did it provide a process through which to plan and build the lanes.[125] When the *Bike 2015 Plan* was released nearly twenty years later, the planners took a different approach by listing 150 projects to be implemented with specific steps and strategies—with close to 100 of those projects successfully implemented by 2015.[126] Since then, Chicago has approved three more plans with significant bicycle infrastructure projects, including Mayor Rahm Emanuel's Chicago 2011 *Transition Plan*, a 2012 Chicago Department of Transportation's (CDOT) 2-year action plan called *Chicago Forward*, and *Chicago Streets for Cycling Plan 2020*, their latest bicycle master plan.[127] While there was certainly overlap between projects the projects in each plan, each plan calls for at over 100 miles of infrastructure projects, with *Chicago Streets for Cycling Plan 2020* calling for a total network of 645 miles of infrastructure.[128] While these plans are ambitious to say the least, they were matched with serious political and staffing backing by the mayor's office and CDOT that allowed them to put their policies and processes to work for them.

Chicago's chief strategy for implementing these plans was through a complete streets policy. While the policy was written and adopted in 2006, CDOT admittedly "lacked a

[125] *Chicago Streets for Cycling Plan 2020*, 12.
[126] Ibid, 12.
[127] Ibid, 11-13.
[128] Ibid, 13-15.

comprehensive strategy for policy implementation."[129] In response to this, CDOT released a *Complete Streets Policy Implementation* report in 2010 in order to form a compliance committee, hire a dedicated Complete Streets Manager to oversee implementation, and set the stage for drafting a mandated complete streets design manual which would include official implementation processes, workbooks, and compulsory checklists for roadway projects.[130] While it took three years to fully develop the manual and begin formalizing processes, it was the implementation report outcomes that eventually empowered Chicago to pursue such ambitious plans today.

While a design manual may seem like an odd place for informing implementation policy, Chicago may have been wise in choosing this format as roadway projects are mandated to be consistent with official designs, forcing the document to be consulted more frequently. Especially if met with the necessary staffing power, structure, and political will to follow them—a design manual can be a great way to not only inject bicycle infrastructure into the local roadway design process, but to ensure that that infrastructure is high quality and consistent. According to Janette Sadik-Khan, current President of the National Association of City Transportation Officials and former Commissioner of New York City Department of Transportation, "these publications are changing the game, pulling away from a bias towards highway designs that simply don't meet the complex needs of cities."[131] For Chicago, a key driver behind their design guide is the idea that "the project delivery process is key to delivering complete streets"—that complete streets needs to be more of a process than a policy.[132]

[129] *Complete Streets Chicago Design Guideline*, (Chicago, IL: Chicago Department of Transportation, 2013), 13.
[130] Ibid, 13.
[131] Janette Sadik-Khan, Foreword to *Urban Street Design Guide* (Washington: National Association of City Transportation Officials, Island Press, 2013) vii.
[132] *Complete Streets Chicago Design Guideline*, 15.

The heart of the *Complete Streets Chicago Design Guideline*'s implementation section is a project delivery model, presented as a matrix of project checklists.[133] Created and overseen by the Compliance Committee and Complete Streets Manager, different lists and line items are assigned to different work groups by task.[134] These checklists were created by performing an extensive audit of all operational practices related to roadway and transportation processes, preparing recommendations for including bicycle and pedestrian interests in those processes, and working with the involved departments to rewrite those updated processes into checklists.[135] The Committee also established a general six-step project delivery model that must be applied to any roadway project to ensure consistency with complete streets standards.[136] While this model is primarily aimed at ensuring bicycle, pedestrian, and transit needs are being met, it also ensures that the appropriate parties are looped into the project and accountably involved.

Ultimately, the oversight and enforcement of the guide is the responsibility of the compliance committee—which meets monthly to assess implementation and make and necessary live updates to work plans.[137] Together with the Complete Streets Manager, the Compliance Committee is also responsible for acting as a center point for communications between the different involved departments, agencies, and jurisdictions—as well as direct approval of any design inconsistencies like travel lanes over eleven feet wide.[138]

The manual also includes provisions to incorporate the complete streets program delivery model in their citywide Arterial Resurfacing Program, which ultimately allows the program to automatically include corresponding bicycle network projects without any proactive intervention

[133] Ibid, 139-140.
[134] Ibid, 139-140.
[135] McCann and Rynne, Complete Streets: Best Policy and Implementation Practices, 47.
[136] *Complete Streets Chicago Design Guideline*, 123.
[137] Ibid, 16.
[138] Ibid, 16.

from a bicycle committee.[139] This simple provision allows for the Compliance Committee to oversee and audit resurfacing projects to ensure that they are following these procedures.

Chicago also employs the quick build model to implement projects in strategic locations. This process is overseen by a bicycle pedestrian project team at CDOT, which actively employs the nine necessary ingredients for a quick build project outlined earlier in this document.[140] While CDOT has extensive staffing resources to implement these projects, they also have a diverse and robust funding stream to pay for it—including CMAQ, local alderman budgets, and privatized revenue from their successful bike share system.[141] This allows CDOT to act efficiently and aggressively in pursuing quick build projects.

Table 6 – Implementation Tools and Staffing; Chicago, Illinois

Implementation Tools and Methods	Implementation Staffing

• Bike master plan
• Implementation plan (as included in *Complete Streets Chicago Design Guidelines*)
• Complete streets policy
• Design manual
• Implementation report
• Project delivery model with checklists
• Resurfacing coordination
• Quick build projects
• Training
	• Complete Streets Manager and Compliance Committee
	  ○ Ensure that all roadway improvement projects are in compliance with the complete streets policy, including resurfacing coordination
	• CDOT Bicycle Pedestrian Project Team
	  ○ Proactively pursue implementation of the bike master plan, including quick build projects

CDOT also employs a training program to help involved staff, planners, engineers, and contractors to better understand the complete streets concept and the project delivery model

[139] Ibid, 131.
[140] Orcutt, *Quick Builds For Better Streets*, 6-17.
[141] Orcutt, *Quick Builds For Better Streets,* 11.

behind it.[142] These training sessions are stated to be robust and well attended, with hundreds of people participating in the first round of workshops.[143]

Seattle, Washington

Similar to Chicago, Illinois, Seattle, Washington was selected as a case study for this project simply because they have employed so many different methods and tools for enabling implementation of their bike infrastructure network. The city passed the *Seattle Complete Streets Ordinance* in 2007, the *Seattle Bike Master Plan* in 2014, the *2015 Bicycle Master Plan Progress Report,* an annual implementation plan every year since 2015, and a slew of other checklists, design manuals, and toolkits to aid implementation. Perhaps because these constantly updated and improved tools, Seattle has become increasing know for what McCann and Rynne refer to as their "swift and methodical" implementation of their complete streets policy.[144] Featured as a case study in McCann and Rynne's Planning Advisory Service report *Complete Streets: Best Policy and Implementation Practices,* the city's wide set of implementation plans, tools, checklists, and guides seem to be primarily geared towards their 2007 *Seattle Complete Streets Ordinance* into the working practices of all parties involved in roadway design, review, and construction.[145] It is this infusing of the complete streets policy into the plans, practices, processes involved in implementation that McCann and Rynne credit for the city's success.[146] "Such integration helps expand complete streets policies into daily operations," the authors state, "making it standard for all staff." [147]

[142] *Complete Streets Chicago Design Guideline,* 132.
[143] Ibid, 132.
[144] McCann and Rynne, *Complete Streets: Best Policy and Implementation Practices*, 59.
[145] Ibid, 59.
[146] Ibid, 59.
[147] Ibid, 59.

When the city adopted the *Seattle Complete Streets Ordinance* in 2007*,* however, there was no accompanying process or written plan for actually implementing the ordinance.[148] Like most complete streets ordinances, the ordinance itself did not spell out the steps for implementing a complete streets policy, only stating that complete streets principles must be considered in all future roadway plans and policies.[149] While this lack of a clear project delivery method or workflow leaves no way to directly enforce or follow complete streets principles, the ordinance did set the stage for such implementation workflows to follow. Perhaps the biggest impact of the ordinance came from a mandate gave the Seattle Department of Transportation (SDOT) bicycle and pedestrian program team the power to review roadway and repaving project plans for consistency with complete streets principles.[150] While no specific guidelines were offered for how the team was to carry out such reviews, the team's review was now a legally required step in any process involving public roadway projects.[151]

While the *Seattle Complete Streets Ordinance* paved the way for integrating bicycle facilities into roadway planning processes, the city would not have an updated bicycle master plan or planned network map to help inform the bicycle and pedestrian program team's review process until seven years after the ordinance was passed. In 2014, the city officially adopted the *Seattle Bike Master Plan,* proposing an impressive 100 miles of protected bicycle lanes and nearly 250 miles of neighborhood greenways to be built within 20 years.[152] The plan also included a full set of recommendations for what facility types should be included on each street, as well as a prioritization framework and project delivery process.[153]

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[148] *Seattle Complete Streets Ordinance*, Ordinance §122386 (Seattle, WA: 2007).
[149] Ibid.
[150] McCann and Rynne, *Complete Streets: Best Policy and Implementation Practices*, 59.
[151] Ibid, 59.
[152] *Seattle Complete Streets Ordinance*, Ordinance §122386 (Seattle, WA: 2007), 7.
[153] *Seattle Bike Master Plan*, (Seattle, WA: Seattle Department of Transportation, 2014).

The prioritization system established by the plan follows a quantitative system that takes into account a long list of factors; city-wide versus local connectors, crash data, vehicular speeds and average daily traffic (ADT), connectivity to the existing network, equity factors (such as communities of color, poverty rates, people under 18 or over 65 years old), and households without access to an automobile), and proximity to key destinations.[154] This quantitative system is then backed up by a qualitative system in which the SDOT bicycle pedestrian team evaluates each project for the potential to leverage other funding (or *project overlap,* as the author refers to it throughout this document), whether the project is specified as a priority by another policy or council, the level and nature of community interest, and whether there is a general geographic balance in each year's project list.[155] This quantitative backup system allows the prioritization system to be flexible and receptive to community input and any opportunities that may arise, such as project overlap with a general repaving plan.

The *Seattle Bike Master Plan* also includes a project delivery model (included in *Table 7* below). While this model only provides loose direction for how implementation should proceed, it did establish a more detailed design process that provided the SDOT bicycle pedestrian team a process with clear steps for reviewing projects.[156] Coupled with the legal mandate that team must review any public roadway project for consistency with complete streets principles, this review process essentially incorporates bicycle and pedestrian priorities into existing workflows rather than creating a new workflow entirely from scratch.

[154] Ibid, 105.
[155] Ibid, 105.
[156] Ibid, 95.

Table 7 – Project Delivery Model, as Established by the 2014 Seattle Bike Master Plan[157]

1.) Project selected through prioritization process for implementation
2.) Project development and design process:
    - Data collection and technical analysis
    - Initial public engagement
    - Conceptual design alternatives
    - More public engagement
    - Evaluate the project through the Race and Social Justice Initiative toolkit
    - Preferred design selected
    - Assess maintenance needs
3.) Further engage public and develop education materials to clearly explain new designs
4.) Pre-implementation marketing
5.) Project implementation
6.) Post-implementation encouragement programming to publicize new facilities
7.) Evaluate projects
8.) Bicycle facility maintenance
9.) Continue evaluation and consideration for upgrades

The *Seattle Bike Master Plan*'s implementation section also includes a list of proposals in order to assist with future implementation, including; the funding of a full-time Bicycle Coordinator, training on bicycle facility design best practices for all involved implementation parties, improved data collection systems, a required update to the *Bike Master Plan* every five to seven years, and the completion of an annual implementation plan with prioritized project lists.[158] The plan also provides that all bike infrastructure related projects must use the Race and Social Justice Initiative's *Racial Equity Toolkit* during the implementation process.[159] This toolkit uses a checklist-based system to see if the project might have negative impacts on racial

[157] Ibid, 94. This is the verbatim project delivery model as described in the *Seattle Bike Master Plan,* not an interpretation by the author.
[158] Ibid, 95-97.
[159] Ibid, 106.

equity, requiring further qualitative review and community engagement if so.[160] While these plan proposals do not include clear steps for completion, their inclusion in the plan as action items may have facilitated their adoption, as the author has found all of these mention proposals to be in practice as of 2017.

Several provisions in the 2014 *Seattle Bike Master Plan* call for annual checkups on the implementation process. As mandated by the plan, SDOT must release a 5-year implementation plan *every year,* as well as an annual progress report and 6-month status updates.[161] The annual implementation plan outlines the specific the steps towards full implementation of BMP that SDOT and partners plan on taking over the next five years, including prioritized project lists, updates on major projects, light performance measures, and an outline of funding assumptions.[162] This system allows SDOT to examine the goals set forth in the 2014 *Seattle Bike Master Plan* every year and create an action plan for the next one to five years, constantly adjusting their process in order to ensure that the implementation process is efficient and fitting for that year's budget realities. It also provides a chance to make soft updates to *Seattle Bike Master Plan* as more detailed information about specific routes and treatments come to light after deeper exploration, research, and experiment brings changes in best practices.[163]

[160] *Racial Equity Toolkit* (Seattle, WA: Race and Social Justice Initiative, 2012), 1.
[161] *2015 Bicycle Master Plan Progress Report*, (Seattle, WA: Seattle Department of Transportation, Vision Zero Seattle, 2015), 4.
[162] *Seattle Bike Master Plan 2016-2020 Implementation Plan*, (Seattle, WA: Seattle Department of Transportation and Vision Zero Seattle, 2016), 5-14.
[163] Ibid, 6.

Table 8 – Seattle Complete Streets Checklist: An Overview of Steps[164]

1.) Is there any overlap with public projects or overlaying plans? Use the *Planning Analysis Coordination Tool*
2.) Is there any overlap with private development? Use the *Shaping Seattle* tool.
3.) Is the project consistent with complete streets design principles? Consult current street design manual.
4.) Follow steps to determine if consultation with the following parties is necessary: *Vision Zero program, Pavement Engineering Management, Parking Program, Transportation Operations, Pedestrian Master Plan Coordinator (PMP), Bike Master Plan Coordinator, Transit & Mobility, Traffic Operations, Landscape Architect Services, Policy and Planning, Urban Design work group, Adaptive Streets Program Manager, SDOT Art Coordinator, Urban Design and SPU*

In 2016, SDOT added an additional implementation tool to their toolbox; a *Complete Streets Checklist.* This checklist equips the bicycle pedestrian program team with an established set of steps for complete street review that is far more detailed and robust than the suggested review steps outlined two years earlier in the *Seattle Bike Master Plan.*[165] Rather than being a comprehensive checklist in itself, the *Complete Streets Checklist* instead involves a series of systems that the team uses to complete each step of the review. In the *Planning Analysis Coordination Tool*, the team uses a mapping tool to see if any public or utility projects are happening in the area in order to check for possible project crossover and coordination.[166] The *Shaping Seattle* tool is a live mapping database of private development projects maintained by Seattle Department of Construction & Inspections that allows the team to search for opportunities to coordinate or leverage private development within the project area.[167] Finally, the last system-based step of the checklist is to consult the street design manual.[168]

[164] *Complete Streets Checklist* (Seattle, WA: Seattle Department of Transportation, 2016).; List as outlined by the checklist, including elaboration from the author.
[165] Ibid, 1-9.
[166] Ibid, 1.
[167] Ibid, 1.
[168] Ibid, 2.

The street design manual is Seattle's most holistic tool for bike network implementation and complete streets enforcement. After the passing of the *Complete Streets Ordinance* in 2007, it was apparent that the existing 2005 *Right-of-Way Improvements Manual* did not include the design requirements or language necessary to enforce the ordinance via design standards.[169] In 2010 the *Right-of-Way Improvements Manual* was updated to better reflect complete streets policies, and was later replaced by *Streets Illustrated*—an interactive web-based street design manual officially adopted in 2017.[170] *Streets Illustrated* includes a highly detailed set of design requirements based on complete streets principles, and also includes an interactive map that details the design recommendations and overlapping details from any bike, pedestrian, transit, or comprehensive plans for every segment of roadway in the city.[171] This design manual not only ensures that future public street projects are consistent with complete streets principles and design best-practices, but that private development remains consistent with these values as well.

Table 9 – Implementation Tools and Staffing; Seattle, Washington

Implementation Tools and Methods	Implementation Staffing
• Complete streets ordinance • Bicycle master plan • BMP progress report • Annual implementation plans • Project delivery model and checklists • Design manual • Resurfacing coordination	• SDOT Bicycle and Pedestrian Program team • Bike Master Plan Coordinator • Vision Zero program team

The amount of effort and energy that Seattle has put into their bike plan implementation systems is staggering. The 2007 *Seattle Complete Streets Ordinance* established the right for SDOT's bike and pedestrian project team to review all roadway projects for consistency with

[169] McCann and Rynne, *Complete Streets: Best Policy and Implementation Practices*, 60.
[170] Seattle Streets Illustrated, December 1, 2017, accessed January 6, 2018, http://streetsillustrated.seattle.gov/.
[171] Seattle Streets Illustrated, December 1, 2017, accessed January 6, 2018, http://streetsillustrated.seattle.gov/.

complete streets principles. The 2014 *Seattle Bike Master Plan* established a planned bike network, complete with project lists, facility types, and a project delivery model that provides the SDOT team with review guidance. The 2016 *Complete Streets Checklist* and *Racial Equity Toolkit* provide the SDOT team with even more detailed steps for project review, ensuring that each project is fully aligned with the department's goals, as well as the goals outlines in the plan. A system of annual implementation plans allows SDOT to revisit the goals established in the *Seattle Bike Master Plan* and create a plan of action for the following year, updating the plan and process as necessary. Annual progress reports and biannual check-in system ensures accountability and provides council with oversight of SDOT's implementation efforts. And the 2017 *Streets Illustrated* web-based street design manual provides one extra level of guidance, serving as both an educational tool for best practices as well as an oversight tool that ensures design consistency with complete street principles for both public and private projects. These systems we all created in response to the implementation needs of city, and while such a robust lineup of implementation tools may not be necessary in a smaller city such as Muncie, Seattle should be looked to as an example of responsible reactiveness in implementation. When one system does not seem to be ensuring implementation as strongly as anticipated, the Seattle example shows that there is always another tool that may be employed to fill the gaps.

Louisville, Kentucky

Louisville, Kentucky came to the author's attention as an appropriate example of bike plan implementation methods that may be applicable to Muncie, Indiana during the 2016 Indiana Bike Walk Summit in Indianapolis. During the summit, the author had the pleasure of meeting with Rolf Eisinger, Bike Coordinator for Louisville, Kentucky, to talk about implementation methods that are more contextually appropriate for small and medium sized cities. Given that a lack of funding and staffing capacity is a common trend for many smaller cities, some of the more robust and expensive implementation tactics employed in larger cities (such as Seattle, Washington and Chicago, Illinois) may seem out of reach for cities like Muncie, Indiana or even Louisville, Kentucky. As such, Louisville, Kentucky was selected for a case study in this project because they have successfully managed to adapt several of the implementation tools used in Seattle and Chicago for use within their own context as a medium size city.

Louisville's push for stronger implementation methods came about in a similar fashion as Chicago and Seattle. After having adopted a complete street policy in 2008 and 2010 *Louisville Metro Bike Master Plan,* Eisinger found that the city was still struggling with efficiently implementing either policy.[172] Inspired by Chicago and Seattle's implementation methods and plans, Eisinger wanted to create a similar style of implementation system for Louisville that could be drafted and updated in-house.[173] The resulting implementation plan came in the form of an annual project update report that could act as a tool for guiding the implementation process, as well as a system for monitoring progress.

While the 2008 Complete Streets Policy and corresponding 2007 *Louisville Metro Complete Streets Design Manual* set the stage for bike infrastructure implementation, the

[172] Eisinger, Rolf. "Intersession Interview, 2016 Indiana Bike Walk Summit." Interview by author. August 30, 2016.
[173] Ibid.

beginnings of an implementation *process* did not truly start to form until the adoption of the 2010 *Louisville Metro Bike Master Plan.* While the plan stopped short of adopting a project delivery model or clear process for actual infrastructure build-out, it did prepare the city for building more robust implementation systems by arming the plan with strong staffing measures. While Louisville Metro's Bicycle and Pedestrian Team (more commonly referred to as Bike Louisville) had already existed before the adoption of the *Louisville Metro Bike Master Plan*, it was the plan that charged Metro Public Works (MPW) with implementation responsibility, and Bike Louisville with the task of overseeing and reviewing the implementation process.[174]

[174] "Chapter 3: Recommendations," in *Louisville Metro Bike Master Plan* (Louisville, KY: Louisville Metro Department of Public Works and Assets, 2010), 3.

Table 10 – Implementation Tools and Staffing; Louisville, Kentucky

Implementation Tools and Methods	Implementation Staffing

• Complete streets policy
• Complete street design manual
• Bicycle master plan
• Implementation plan / annual project update
  o Project delivery model and checklists
  o Resurfacing coordination
• Strategic communications plan
	• Metro Public Works (MPW)
	• Bike Louisville (Louisville Metro's Bicycle and Pedestrian Team)[175]
	  o Full-time staff members (2)
	• Implementation "Project Team"[176]
	  o Bike Louisville
	  o Louisville Metro staff support members (4)
	  o Bicycling 4 Louisville representative
	  o Transit Authority of River City (TARC) representative
	  o Parking Authority of River City (PARC) representative
	  o Louisville Downtown Partnership (LDP) representative
	  o Local planning consulting firm representative
	• Bike Louisville E Teams[177]
	  o Education and Encouragement Team (11 members)
	  o Enforcement Team (7 members)
	  o Engineering and Evaluation Team (see Implementation "Project Team" above) (7 members)

The plan also worked to increase the staffing and organizational capacity of Bike Louisville even further by creating three sub-committees or E Teams tasked with implementing different aspects of the plan.[178] These teams included the Education and Encouragement Team, the Enforcement Team (including representative from Louisville Metro Police), and the Engineering and Evaluation Team.[179] According to the plan, these E Teams allow Bike

[175] *Louisville Metro's Bicycle Master Plan Project Updates 2016-2020*, (Louisville, KY: Louisville Metro Department of Public Works and Assets, 2016), 6-11.
[176] Ibid, 11.
[177] "Chapter 1: Introduction," in *Louisville Metro Bike Master Plan*, 7.
[178] "Chapter 1: Introduction," in *Louisville Metro Bike Master Plan* (Louisville, KY: Louisville Metro Department of Public Works and Assets, 2010), 7.
[179] Ibid, 8.

Louisville to, "take a group of people who are interested in the same vision, mission and goal and separate them into different areas that fit their skill set and interest."[180] However, this system also gifted Bike Louisville with a strong organizational structure that helps to expand the capacity of the organization well beyond their full-time staff of two. While Bike Louisville is staffed only two full-time employees, the plan tasked four additional Louisville Metro employees with part-time responsibilities under Bike Louisville.[181] Each E Team is led by one of these Louisville Metro employees, who coordinate meetings and strategies for team goal, and ultimately report to Eisinger for oversight and direction.[182] (More representative members were later added to Bike Louisville's organizational structure through the *Louisville Metro's Bicycle Master Plan Project Updates 2016-2020* in 2016, as is discussed later in this section.)

While the *Louisville Metro Bike Master Plan* did create a strong system for staffing and assignment of responsibility, as well as an action plan matrix outlining next steps, it did not create an implementation process or project delivery model. Although the plan did include a 36-page action plan outlining implementation leads, partners, and milestones for non-infrastructure projects (such as "collect bicycle crash data"), all of the infrastructure projects in the plan were limited to a future project list with no clear process for implementation.[183] While the lengthy action plan matrix may have been a great method for spearheading non-infrastructure projects (like updating maps, developing wayfinding signage standards, and starting/maintaining education programs), the lack of a project delivery model left the question of how to actually build out the bike network entirely unanswered, aside from the suggestion that Metro Public Works and Bike Louisville were charged with the task.

[180] Ibid, 7.
[181] Ibid, 7.
[182] Ibid, 7.
[183] "Chapter 4: Implementation," in *Louisville Metro Bike Master Plan* (Louisville, KY: Louisville Metro Department of Public Works and Assets, 2010), 45.

Due to this lack of clarity around any process for infrastructure implementation, Eisinger explained to the author that the city struggled considerably with construction of their bike network in the years immediately following the adoption of the plan in 2010.[184] In response, Eisinger saw a need for an implementation plan that could provide a clear and simple process for implementing the infrastructure recommendations of the bike master plan. In creating this implementation plan, Eisinger and the Bike Louisville team sought to craft a clear and concise document that could be used as tool by those involved in the implementation process, and that could also be easily updated in house on an annual basis.[185]

The resulting tool was the *Louisville Metro's Bicycle Master Plan Project Updates 2016-2020,* officially adopted in 2016. Acting as an implementation plan, the project update report includes both a project delivery model and reporting system to track progress and enforce accountability.[186] According to Eisinger, the document was largely based on the *Seattle Bike Master Plan 2016-2020 Implementation Plan*, borrowing many of the concepts, purposes, and even wording from the plan.[187]

At the heart of this document is a single diagram outlining the project delivery model, labeled here as the "Urban Bike Network Process Map."[188] This diagram graphically breaks the implementation process down into seven simple steps, each with concise instructions on what each party should be doing during that stage of the process.[189] (An image of this diagram can be seen in *Table 11* below.) This process map has proven to be of vital importance for

[184] Eisinger, Rolf. "Intersession Interview, 2016 Indiana Bike Walk Summit." Interview by author. August 30, 2016.
[185] Ibid.
[186] *Louisville Metro's Bicycle Master Plan Project Updates 2016-2020*, (Louisville, KY: Louisville Metro Department of Public Works and Assets, 2016), 5.
[187] Eisinger, Rolf. "Intersession Interview, 2016 Indiana Bike Walk Summit." Interview by author. August 30, 2016.
[188] *Louisville Metro's Bicycle Master Plan Project Updates 2016-2020*, 11.
[189] Ibid, 11.

implementation in Louisville, with Eisinger crediting the process for drastically increasing Louisville's implementation efficiency.[190]

The process map section of the document also organizes a new Project Team that includes Bike Louisville, four support members from Louisville Metro staff, a representative from Bicycling 4 Louisville (a privately organized non-profit bike advocacy organization), and a representative from GS&P (a local planning consulting firm contracted for engineering and design work).[191] The Project Team also calls for an optional representative from the Transit Authority, Parking Authority, or Downtown Partnership should the project have an impact within their jurisdiction.[192] While the rest of the plan is clearly important, it is a clear process and a strong team that Eisinger ultimately credits for the city's efficiency in implementation.[193]

[190] Eisinger, Rolf. "Intersession Interview, 2016 Indiana Bike Walk Summit." Interview by author. August 30, 2016.
[191] *Louisville Metro's Bicycle Master Plan Project Updates 2016-2020*, 11.
[192] Ibid, 11.
[193] Eisinger, Rolf. "Intersession Interview, 2016 Indiana Bike Walk Summit." Interview by author. August 30, 2016.

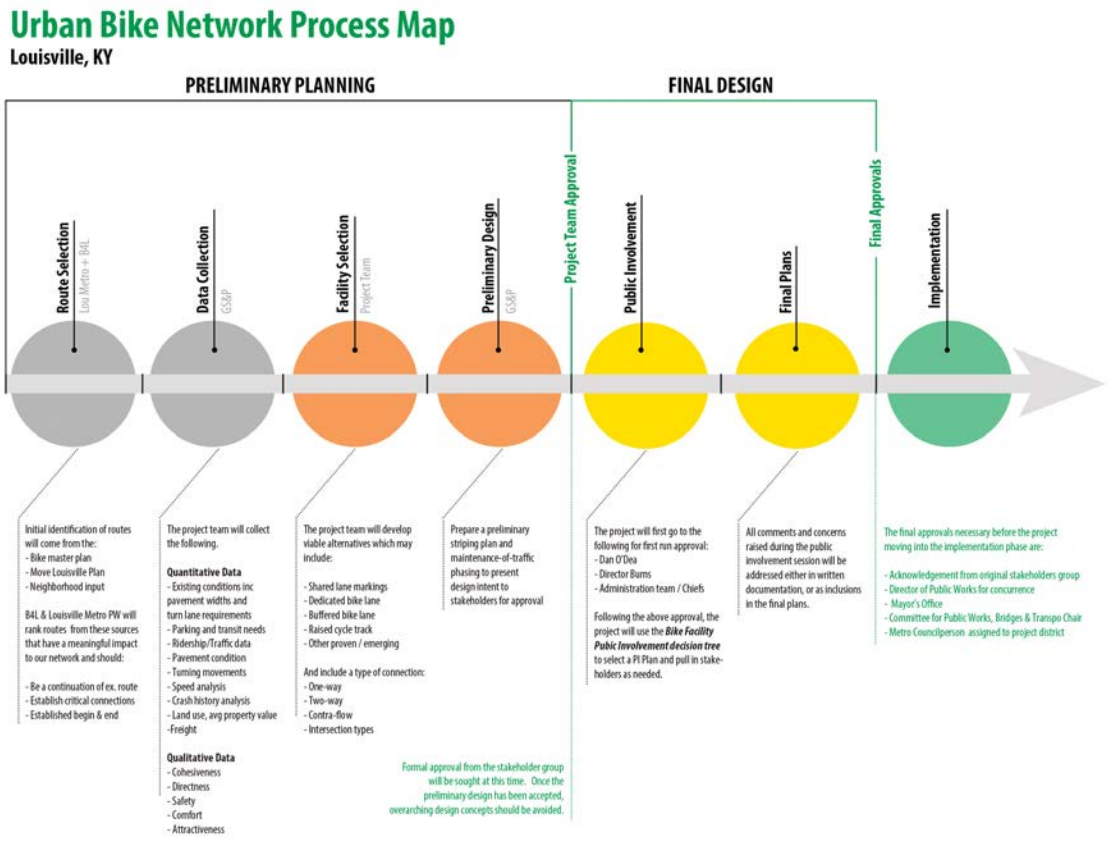


Image 11 - Project Delivery Model for Louisville, Kentucky. *Source: Louisville Metro's Bicycle Master Plan Project Updates, 2016-2020.* [194]

The *Louisville Metro's Bicycle Master Plan Project Updates 2016-2020* also includes an updated prioritization system and project list. The prioritization system, originally established in the *Louisville Metro Bike Master Plan,* involves a point-based system similar to those used in Chicago and Seattle. This system calculates priority points based on connectivity (40 points), equity (20 points), safety (30 points), and other barriers or project overlap (30 points).[195] While this system was originally established in the bike master plan, its use in the implementation plan allows for projects to be reprioritized on an annual basis based on current conditions and opportunities. This prioritization system then results in a long list of projects, outlining the

[194] *Louisville Metro's Bicycle Master Plan Project Updates 2016-2020*, 11.
[195] Ibid, 18.

project location, facility type, priority, estimates cost, and implementation year.[196] This list, coupled with the project delivery model, acts as an action plan that guides the Project Team and other involved in implementation forward.

The document also includes a chapter on cost and funding assumptions, loosely estimating the cost of each project segment. According to Eisinger, these cost-estimates were calculated using cost-per-mile averages for each facility type based on figures from previous projects and guides such as *Costs for Pedestrian and Bicyclist Infrastructure Improvements* and FHWA's *Incorporating On-Road Bicycle Networks into Resurfacing Projects.*[197] These figures allow the project team to more easily estimate budgets and plan projects around the city's financial capacity for any given year.

In 2016, Bike Louisville, Louisville Metro, and Look Alive Louisville (the city's pedestrian safety program) worked together to create and adopt an official *Strategic Communications Plan.*[198] Recognizing the large number of organizations and individuals working on bicycle and pedestrian projects across the city, the *Strategic Communications Plan* was spearheaded by Eisinger as a tool for more directly connecting on-the-ground advocates and organizations with the decision-making and oversight bodies charges with project implementation. While this plan is not exactly focused on changing bike network implementation methods, it does provide a loose framework for coordinating outreach and education programs. Although this plan is directly intended to help guide and inform the city's bicycle education and outreach programs (and not necessarily impact the project delivery model

[196] Ibid, 18.
[197] Max A. Bushell et al., *Costs for Pedestrian and Bicyclist Infrastructure Improvements; A Resource for Researchers, Engineers, Planners, and the General Public*. (Chapel Hill, NC: UNC Highway Safety Research Center & Federal Highway Administration, 2013).; *Incorporating On-Road Bicycle Networks into Resurfacing Projects* (Washington DC: U.S. Department of Transportation, Federal Highway Administration, 2016).
[198] *Strategic Communications Plan*, (Louisville, KY: Louisville Metro, Look Alive Louisville, Bike Louisville, 2016).

for infrastructure roll out), Eisinger suggests that the direct lines of communication established between advocates and governing bodies have greatly helped establish clearer communications in the implementation process.[199]

In the end, Louisville provides an excellent example for a smaller and financially limited city like Muncie, as their implementation methods are tailored around maximizing the staffing and organization capacity of the project team, despite having a dedicated full-time staff of only two people. Unlike Chicago and Seattle, Louisville's implementation methods are refreshingly simple, consisting of little more than a strong organizational structure, a clear project delivery model, and an annual update system that produces a concise project list. By creating such clear steps and bringing a large number of stakeholders onto the project team through an organized system, the limited Bike Louisville staff is able to oversee and direct a rather ambitious list of projects each year. While Muncie's staffing and financial resources for bike plan implementation is certainly strained, Louisville's example is a clear demonstration that creating a strong organizational structure can have an incredible impact on the city's capacity for implementation success.

Bloomington, Indiana

Bloomington, Indiana was selected as a case study for this project for three main reasons. First, Bloomington has an impressive network of bicycle infrastructure for a smaller city, including a high-quality rail trail system called the B-Line, a grid of simple on-street bike lanes through the downtown core, and a system of low-stress neighborhood bike routes that employs innovative roadway treatments to calm traffic and increase comfort for cyclists. Second, Bloomington is contextually similar to Muncie in land area and population, as well as being a

[199] Eisinger, Rolf. "Intersession Interview, 2016 Indiana Bike Walk Summit." Interview by author. August 30, 2016.

city that is host to a public university.[200] These similarities mean the methods and implementation strategies used in Bloomington are much more likely to be contextually appropriate and adoptable in Muncie than the tactics employed in major metropolitan centers. Third, Bloomington has taken a remarkably unique (yet simple) approach to implementation planning that may prove to be a viable option for Muncie to explore after the adoption of the *Muncie Delaware Bicycle Master Plan* in 2018.

While Bloomington's notoriety as a bike town began in the 1950's with the founding of the iconic Little 500 bike race, continuing with the release of the 1979 feature film *Breaking Away*, the city's development into a world-class community for transport cycling is more of a recent history. In 2003 the city was recognized as a bronze level Bicycle Friendly Community by the League of American Bicyclists, upgrading that rating to the gold level in 2014.[201] In 2011, Indiana University Bloomington was recognized as a bronze level Bicycle Friendly University, with that status changing to the silver level in 2017.[202]

While Bloomington has adopted several bicycle network plans over the years, the city's more recent history with bicycle network implementation began with the adoption of their current bicycle master plan in 2008. Titled the *Bicycle and Pedestrian Transportation & Greenways System Plan,* the plan serves as an update to the *2001 Alternative Transportation and*

[200] Bloomington's land area and population were estimated to be 23.44 square miles and 85,071 people in 2017, while Muncie's land area and population were estimated to be 27.60 square miles and 68,625 people for the same year. *Land Areas of Incorporated Places*,(U.S. Census Bureau, Census Gazetteer, 2017).; *Annual Estimates of the Resident Population, 2017 Population Estimates*, (American Fact Finder, U.S. Census Bureau, Population Division, 2017).
[201] *Bicycle and Pedestrian Transportation & Greenways System Plan,* (Bloomington, IN: City of Bloomington, 2008), 6.; Bethany Nolan, "IU Bloomington Named a Silver-level Bicycle Friendly University by the League of American Bicyclists," News at IU Bloomington, November 21, 2017, accessed December 10, 2017.
[202] Bethany Nolan, "IU Bloomington Named a Silver-level Bicycle Friendly University by the League of American Bicyclists," News at IU Bloomington, November 21, 2017.

Greenways System Plan.[203] Having sprouted from a fairly robust public engagement process, the updated plan outlines the community's vision and goals for the future of bike infrastructure development in Bloomington, as well as establishing a prioritized future network of bike and pedestrian facilities. While these elements—a public process and established future network—are generally the backbone of any effective bicycle master plan, the *Bicycle and Pedestrian Transportation & Greenways System Plan* is unfortunately lacking the implementation provisions necessary to bring such a network to fruition. Although the introduction of the plan clearly stated that, "an effective implementation strategy is fundamental to these ongoing efforts," the latter sections of the plan do not actually outline any implementation strategies aside from suggesting the priority levels of different routes.[204] Even the "strategic plan" section of the plan failed to suggest any methods, project delivery models, workflows, assigned responsibilities, accountability measures, or any other strategies for implementation. While this shortcoming may be commonplace for bicycle master plans, it is an unfortunate one that undercut the plan's strength.

However, despite any lack of implementation strategy, the plan did include two items that are absolutely pivotal for advancing implementation—increased staffing, and earmarked funding. Understanding that implementation would require an increase in staffing capacity, the Bloomington/Monroe County Metropolitan Planning Organization (from here out referred to as the BMCMPO) created a position for a transportation planner responsible for coordination and implementation in tandem with the development of the plan.[205] While many plans make a request for increased staffing within the document, the creation of a staffed position for plan generation

[203] *Bicycle and Pedestrian Transportation & Greenways System Plan,* (Bloomington, IN: City of Bloomington, 2008), v.
[204] Ibid, iv.
[205] *Bicycle and Pedestrian Transportation & Greenways System Plan,* iv.

is a creative move that may effectively set the stage for progress. The plan was also unique in that it was met with dedicated funding from the start, with City Council approving an *annual* allocation of $500,000 for plan implementation.[206] While both the staffing and funding provisions were mentioned only briefly in the plan, these provisions are perhaps the most important tools included for implementation.

Bloomington also employs a complete streets policy as an implementation tool. Officially adopted in 2009, the policy requires a complete streets review of all roadway construction or reconstruction projects under the BMCMPO's jurisdiction that use federal funds or are included in the Transportation Improvement Plan.[207] While many complete streets policies fail to provide an actual mechanism for policy enforcement, Bloomington's policy includes the development of a process for evaluation and enforcement. Through this process, the BMCMPO puts out an annual call for any roadway projects that will fall under their jurisdiction, requiring each project to be approved by a Citizens Advisory Committee and Technical Advisory Committee, and finalized by a Policy Committee.[208] These committees review each project to ensure they meet the policy's requirements. Strengthening the policy even further, the wording behind project requirements is impressively progressive, requiring *all* reviewed projects to, "accommodate all users of the transportation system, including pedestrians, bicyclists, users of mass transit, people with disabilities, the elderly, motorists, freight providers, emergency responders, and adjacent land users."[209] The policy then requires any party in charge of roadway engineering or construction, whether a municipal streets department or private developer, to provide ongoing

[206] Ibid, 48.
[207] *Bloomington Complete Streets Policy,* (Bloomington, IN: Bloomington Monroe County Metropolitan Planning Organization, 2009), 1.
[208] Ibid, 2.
[209] Ibid, 2.

reports and updates to BMCMPO's Citizens Advisory Committee, Technical Advisory Committee, and Policy Committee in order to ensure ongoing policy compliance.

Table 12 – Implementation Tools and Staffing; Bloomington, Indiana

Implementation Tools and Methods	Implementation Staffing

• Bike master plan
• Complete streets policy
• 3rd party review (Journey to Platinum)
• Bike facility design guide
• Implementation plan
• University bike master plan
	• Bike Coordinator (Transportation Planner)
	• BMCMPO - Complete streets compliance
	  o Citizens Advisory Committee
	  o Technical Advisory Committee
	  o Policy Committee
	• Platinum Task Force
	• Bloomington Bicycle and Pedestrian Safety Commission
	• Indiana University Transportation Demand Management Coordinator and Bicycle Manager

Despite their success in passing a complete streets policy and expanding their funding and staffing capacity, the city decided to create a new implementation push in 2010, setting the goal of becoming a recognized platinum level Bicycle Friendly Community by 2016.[210] This push was started by resolution in the Bloomington Common Council, convening a citizen-led task force charged with drafting an action plan for working towards their new platinum level goal. This was an extremely ambitious goal. At the time, only Boulder, Colorado; Portland, Oregon; and Davis, California were platinum level communities, and only two additional communities—Fort Collins, Colorado and Madison, Wisconsin—were added to the list between 2010 and 2017.[211] The Platinum Task force, as the group came to be called, convened two public meetings a month for a year between 2010 and 2011, building an action plan for advancing bicycle education, events and programming, and the physical development of their bike

[210] *Breaking Away: Journey to Platinum, Final Report,* (Bloomington, IN: Bloomington Platinum Bicycle Task Force, 2011), 6-7.
[211] "Bicycle Friendly Communities," League of American Bicyclists, April 06, 2016, accessed November 23, 2017, http://bikeleague.org/community.

network.[212] The resulting plan largely consisted of a series of action plan tables, each listing a project, estimated capital cost, lead agency, partners and yearly benchmarks. However, while these tables provide some high-level details that may aid implementation, they only list 20 specific infrastructure projects, leaving the rest to conjecture. Because the plan's focus was more on achieving platinum status than implementing the bicycle master plan network, 29 of the strategies in the action plan tables call for building more miles of bicycle infrastructure without actually detailing where these projects would be built. In the end, this plan seems remarkably difficult to implement, as the action plan provides little direction beyond calling for an increase in infrastructure mileage, as well as failing to suggest any process or mechanism for delivering such an increase.

Shortly after the release of the *Breaking Away: Journey to Platinum, Final Report* in 2011, the city hired Alta Planning and Design to spearhead the 2012 *Bloomington Bikeways Implementation Plan*. Perhaps due to the lack of implementation strategies in previous plans and efforts, however, this plan proved to be quite different from any other implementation plan the author has encountered.

While the 2008 *Bicycle and Pedestrian Transportation & Greenways System Plan* included 77 total infrastructure projects, the implementation plan project team recognized that a plan of that size includes too many projects to effectively fund and build in a singular long-term planning process.[213] Following input from participants during the bike master plan development process, the team started with a list of on-street bike lanes from the bike master plan, and

[212] *Breaking Away: Journey to Platinum, Final Report,* 7.
[213] Adrian Reid, Kimberly Pitcher, and Brian Martin, "Bloomington Bikeways Implementation Plan: Bikeways From Plan to Construction" (lecture slides, Indiana MPO Conference, Bloomington, October 17, 2012), 14.

reprioritized them to weigh for ease of implementation.[214] This resulted in a list of ten immediate term projects and thirteen longer term projects for the city to proactively spearhead, complete with maps, assigned project years, cost-estimates, and a phasing plan with estimated annual budgets.[215]

Although a reprioritized list of projects is a common and necessary part of an implementation plan, BMCMPO took it one step further by adding conceptual level designs for *each project* into the scope of work.[216] To accomplish this, engineering firm Burgess & Niple was brought in to design the details of each listed project, vetting the designs through an advisory committee, training sessions with local staff, and a public workshop.[217] As a result the *Bloomington Bikeways Implementation Plan* is 11 pages of explanation and deliberation, and 105 pages of curb, striping, and signage plans and cross-section renderings for each of the 23 individual bike lane projects.

The *Bloomington Bikeways Implementation Plan* still does not include an established process for implementation. It does, however, address a set of logistical and contextual needs that appear to be unique to Bloomington. Although Bloomington is a relatively small city, the 2008 *Bicycle and Pedestrian Transportation & Greenways System Plan* process resulted in a staffed position and $500,000 annually of dedicated local funds for implementation.[218] This allows the MPO to spearhead individual bicycle infrastructure projects proactively without having to obtain funding on a project-by-project basis. In addition, having the concept designs already vetted and finalized for the next 23 projects allows these projects to be pursued without

[214] Adrian Reid, Kimberly Pitcher, and Brian Martin, "Bloomington Bikeways Implementation Plan: Bikeways From Plan to Construction", 16.; *Bloomington Bikeways Implementation Plan*, (Bloomington, IN: City of Bloomington, Burgess & Niple, Alta Planning and Design, 2012), 3.
[215] *Bloomington Bikeways Implementation Plan*, 3-7.
[216] Adrian Reid, Kimberly Pitcher, and Brian Martin, "Bloomington Bikeways Implementation Plan: Bikeways From Plan to Construction", 17.
[217] Ibid, 17.; *Bloomington Bikeways Implementation Plan*, 3-7.
[218] *Bicycle and Pedestrian Transportation & Greenways System Plan,* 48.

having to go through the design phase on a project-by-project basis as well. Rather than create an implementation process to be followed for each individual project, the *Bloomington Bikeways Implementation Plan* simply *eliminated* the planning and design phase for every upcoming project, freeing the city to move into the engineering and construction phases of implementation more easily.

Like Muncie, Bloomington is also fortunate to be home to a sizable university with an interest in bicycle network development. In 2015 Indiana University Bloomington hired Rundell Ernstberger Associates—the same firm working on both the 2018 *Muncie Delaware Bicycle Master Plan* and 2018 *Ball State Bicycle Master Plan*—to develop the *Indiana University Bicycle Master Plan.* Although the *Indiana University Bicycle Master Plan* does not include a project delivery model or process for maintaining coordination, the university and city have displayed a collaborative relationship—announcing a jointly-funded bike share program launching in 2018.[219] Indiana University also employs a Transportation Demand Management Coordinator and Bicycle Manager (one position), who is responsible for plan implementation and coordination with the city and BMCMPO.

Bloomington is the clear outlier in this case study. It is the smallest of case study cities, and arguably has the least resources for implementation. In addition, the city has yet to establish an official implementation process or project delivery model, despite the multiple implementation plans that have been developed since the adoption of their bike master plan in 2008. What Bloomington lacks in systems, however, they make up for strategic funding dedication. While the *Muncie Bike Implementation Plan 2017-2021* written by the author

[219] "City of Bloomington, Indiana," Bloomington Bike Share Project, October 31, 2017, accessed December 15, 2017. https://bloomington.in.gov/transportation/bike/bike-share-project.; Bethany Nolan, "IU Bloomington Named a Silver-level Bicycle Friendly University by the League of American Bicyclists," News at IU Bloomington, November 21, 2017, accessed December 10, 2017.

proposes developing infrastructure at an aggressive rate over a five year period, the total estimated cost of such a plan (under $1.3M spread between multiple funding sources) comes in at roughly half of Bloomington's *locally* allocated implementation budget alone ($2.5M over five years).[220] What's more, the city's $500,000 annual implementation budget can be stretched even further than usual, as each of their next 23 projects are already past the expensive concept development and design phases.

The Bloomington example is perhaps a demonstration that with enough consistent funding and political support, aggressive bike network implementation can occur without a set system or project delivery model. Although Muncie's financial and staffing capacity clearly does not present the city with such an opportunity to use locally, the Bloomington example may still be partially scalable to Muncie's context. While it is unlikely that Muncie or Delaware County could ever be in a financial position to earmark $500,000 annually towards bike plan implementation alone, it is clear that any level of consistently allocated implementation funding would help to increase plan implementation. Likewise, an investment in designing project concepts and striping plans up front would greatly reduce the burden placed upon the Muncie Streets Department, as well as decrease the incidence of costly, last-minute engineering changes.

Methodology

After mining best practices from the above documents and case studies, the author drafted a context-appropriate bicycle network implementation plan for the City of Muncie (included in the appendix of this document). This chapter provides explanation and insight into how the author created the implementation plan—providing both a detailed methodology and direct link to prior evidence and best practices. The ultimate goal of this chapter, and ultimately

[220] *Bicycle and Pedestrian Transportation & Greenways System Plan,* 48.

this entire document, is to provide insight and guidance for creating and adopting a bicycle network implementation plan for Muncie. While the implementation plan (or parts thereof) created by the author may be adapted for official use after the completion of the *Delaware-Muncie Bicycle Master Plan*, this chapter may also provide guidance for drafting a free-standing implementation plan should the Bicycle Pedestrian Advisory Committee choose to draft an implementation plan independently.

Based on the above plans and best practices from case studies, the author's implementation plan adheres to a guiding principle of brevity. Because an implementation plan should be building off of the community-based work of a bicycle master plan, it does not need to contain lengthy sections on background, context, or details into the plan process. Instead, the implementation plan should contain only the information necessary for implementing the BMP and its projects, and for keeping momentum going. Too much information that does not directly impact or guide information may cause the final product to be less focused, more difficult to navigate, and ultimately less useful. Ultimate, the goal of the implementation plan is not only to be useful, but to be used as a tool. The plan should also be replicable, easily updated, and treated as a living document to be changed as necessary.

The remainder of this chapter will be split into sections, with each dedicated to the methodology behind an individual concept presented within the implementation plan. It is important to note that the below sections do not serve to summarize the implementation plan itself, but rather summarize the methodology employed in crafting each. For details on the exact recommendations offered in the implementation plan, please refer to the appendix.

Staffing

While calling for increased staffing capacity is not typical of every bicycle implementation plan, it can be a common and important feature for cities facing serious staffing needs. Louisville, Kentucky's 2016 implementation plan, for example, devoted a one-page chapter to calling for a full-time employee to assist Bicycle Coordinator Rolf Eisinger.[221] Similarly, the *Urbana Illinois Bicycle Master* states, "having full-time bicycle coordinators is critical in integrating bicycling in all of a city's plans and projects."[222]

Although the parties involved in bicycle project implementation in Muncie are clearly dedicated and serious, the city's difficulty coordinating and implementing projects may be seriously impacted through the hiring of a full-time coordinator. Especially as implementation plans create systems for handling the implementation process, it is vital for such plans to acknowledge any capacity gaps and call for their remedy.

Project Delivery & Implementation Methods

The methodology used by the author for creating a project delivery model is largely straightforward and organic. After mining the above documents and case studies for best practices, the author blended several of these practices in order to create a system that is more context appropriate for application in Muncie. While the project delivery model is a key component of the implementation plan, it is also one of the least scientific.

As resurfacing already makes for a majority of the city's roadway projects, the model's backbone is based on the resurfacing method suggested in *Incorporating On-Road Bicycle Networks into Resurfacing Projects*.[223] This method suggests updating the city's current

[221] *Louisville Metro's Bicycle Master Plan Project Updates 2016-2020*, 9.
[222] *Urbana Bicycle Master Plan 2016 Draft Report*, (Urbana, IL: Champaign-Urbana Urbanized Area Transportation Study, 2016), 47.
[223] *Incorporating On-Road Bicycle Networks into Resurfacing Projects*.

resurfacing process to automatically include the consideration of bicycle infrastructure earlier on in the process than currently provided, as well as suggesting when and how the responsible parties should communicate and update shared project lists.

On top of aligning bicycle infrastructure projects with current resurfacing model, the author suggests convening a Bicycle Action Group as a subgroup of the Bicycle Pedestrian Advisory Committee to spearhead Quick Build projects as suggested by Orcutt.[224] This would allow the network construction order to more closely resemble community priorities by allowing for the implementation of priority projects that do not align with upcoming resurfacing projects. The model also suggests the continuation and expansion of project partnering in order to take advantage of new opportunities and leverage funding.

While Complete Streets policies are certainly important tools for expanding bicycle, pedestrian, and transit networks, the author decided to leave Complete Streets out of the implementation plan because it is not actually an implementation tool. Just like a bicycle master plan, a Complete Street policy does not implement itself, instead requiring a change in process to ensure construction. While the author is highly supportive of adopting a Complete Streets policy in Muncie, such a policy is still in need of a process or system of implementation.

Additionally, the author decided to leave check-lists and forms (aside from the plan itself) out of the project delivery model, as they did not seem necessary in context. In interviews with Johnson of Bike Muncie and Campbell of Public Works, neither party thought a formal check-list or system of forms would be helpful, instead preferring a model that requires regular in-person meetings and phone calls between the two for handling interdepartmental communications.[225] Due to the small size of the overall cohort responsible for implementation,

[224] Jon Orcutt*, Quick Builds For Better Streets: A New Project Delivery Model For U.S. Cities*.
[225] Johnson, Kyle. Interview. June 18, 2017.; Campbell, Duke. Interview. June 23, 2017.

the author agreed that a system that is less dependent on formal paperwork—while still maintaining a structure based on the project delivery model and project lists—would be favorable in this context.

Prioritization & Benchmarking

Project prioritization for bicycle network implementation is almost always based on a calculated points system. Seattle, for example, considers safety (40 points), connectivity (25 points), equity (20 points), ridership (10 points), and livability (5 points) in order to craft a final ranking score for each project.[226] Louisville considers connectivity (40 points), equity (20 points), safety (30 points), and "other barriers (30 points).[227] Unfortunately, comprehensive crash, safety, ridership, and mode share data is not available for Delaware County, necessitating creative measures for prioritization. (Note: improvements in data collection and reporting were included by the author in the request for proposals for the *Muncie Delaware Bicycle Master Plan*, and are expected to be further developed during the planning process in 2017 and 2018.)

In response to a lack of available data, the author created a prioritization system based on calculated equity, connectivity, and inclusion in overlapping plans (namely Safe Routes to Schools projects), each weighed equally on a ten-point scale.

Equity

Finding bicycle infrastructure to hold the power to connect diverse neighborhoods and provide residents with affordable transportation options, many cities today are addressing equity as a top concern when prioritizing network development. Perhaps even more powerful in a city facing many layers of economic and racial segregation, the role of equity prioritization is all the more important in Muncie.

[226] *Seattle Bike Master Plan 2015-2019 Implementation Plan*, 7.
[227] *Louisville Metro's Bicycle Master Plan Project Updates 2016-2020*, 7.

To calculate equity, the author the Bicycle Equity Index model developed by Rachel Prelog for the League of American Bicyclists in 2015.[228] This model uses GIS analysis of American Community Survey data to analyze transit-dependent indicators (population over 65, under 18, and zero-car households) and environmental justice indicators (percent non-white or Hispanic, and poverty level) for each block group. The five indicators are then calculated into one Bicycle Equity Index score for each block group by adding the sum of each associated indicator's z-score. These calculations and their final index scores were performed by the author, who additionally presented all GIS data and files to the Delaware County GIS department and Bicycle Pedestrian Advisory Committee for future use. (Maps of the block groups and infrastructure segments coded by Bike Equity Index Scores can be found on pages 47 and 48 in the plan, or pages 157 and 158 in the appendix of this document.) For step-by-step instructions on repeating Prelog's method, please refer to the noted report.[229]

The author then used a GIS function to assign each project segment a BEI score based on the block group most covered by the segment. Project segments were kept short in order to accommodate such practices—a twenty block long cycle track, for example, might be split into four segments of around five blocks each. Keeping segments short in this way improves the quality and accuracy of analysis, and also increases the accuracy of overlap with future repaving efforts, as will be discussed later in this section.) Project segments were then ranked by assigned BEI, and split into quartiles (25%, 50%, 75%, 100%). Quartile scores were then standardized to a zero to ten-point scoring system, with the lowest quartile starting at zero points (0-24.99 percentile projects received no points, 25-49.99 percentile projects received 3.33 points, 50-74.99 percentile projects received 6.66 points, and 75-100 projects received 10 points). Setting

[228] Rachel Prelog. *Equity of Access to Bicycle Infrastructure, GIS methods for investigating the equity of access to bike infrastructure.* (Washington, DC: The League of American Bicyclists, 2015).
[229] Ibid.

the lowest quartile to zero points ensures that infrastructure projects will not be granted prioritization points for equity when they are located in the least challenged and most socially mobile block groups.

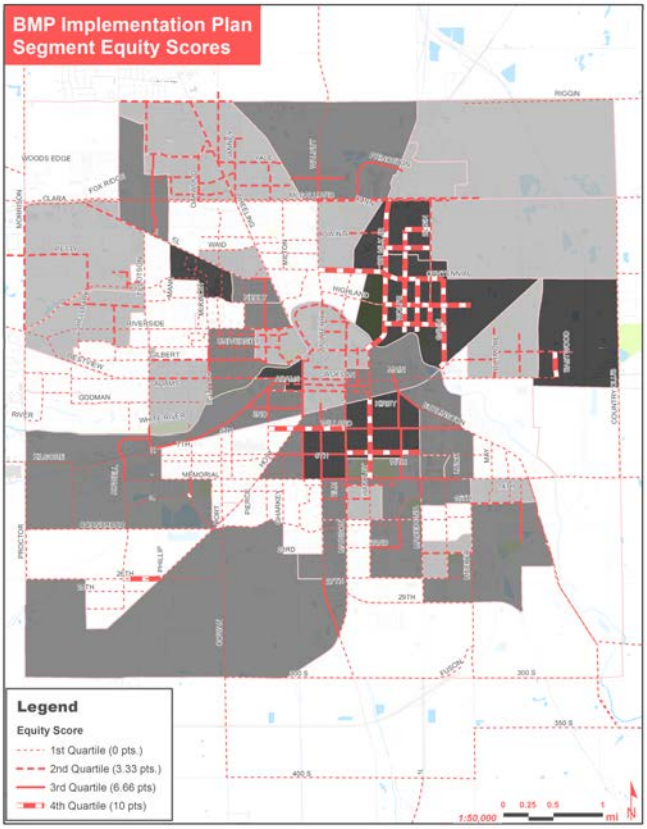


Image 12 – Map of Segment Equity Scores. A full-sized version of this map can be found on page 48 of the implementation plan, or page 158 in the appendix of this document. *Source: author.* [230]

This implementation plan may be among the first to use a data-driven method for addressing equity in implementation prioritization—indeed, the author was unable to find even one other example to do so. The implementation plans addressed in this study, for example, all rely up a more organic method of simply selecting projects located in challenged neighborhoods

[230] Richard Tymczyszyn, "Muncie Bike Implementation Plan 2017-2021" Creative Project, Ball State University, 2018, Master of Urban and Regional Planning, 48.

and assigning them more points. Such a system leaves equity prioritization extremely vulnerable to human error and leaves for a less accountable process. However, a more organic selection process may be beneficial for selecting projects that connect challenged neighborhoods to areas of opportunity—a measure the author took into account in the connectivity scoring section.

Bicycle Equity Index scores for block groups as well as quartile scores for each project segment were then mapped by the author, and can be seen on pages 47 and 48 of the Implementation Plan, or pages 157 and 158 in the appendix of this document.

Connectivity

In crafting a calculation for connectivity, the author sought to address both access (connecting the network to areas currently lacking infrastructure) and network (ensuring new infrastructure projects connect to the current network). To balance both, connectivity is based on prioritizing longer, major corridors that can connect low-access neighborhoods to the existing network. This is difficult to automate without current use or demand data, but can be done manually using GIS software. First, the author manually selected citywide connectors, assigning each seven points. These are the high-volume across town routes that a resident would likely end up on if riding to a destination further than a bordering neighborhood. Local connectors that connect low-access (identified as existing outside of a quarter mile buffered service area around existing bike infrastructure) neighborhoods to citywide connectors were then selected and awarded three and a half points. Infrastructure segments that did not serve as either citywide or local connectors were not granted points. These segments were then displayed on a map, as can be seen on page 46 of the implementation plan, or page 156 in the appendix of this document.

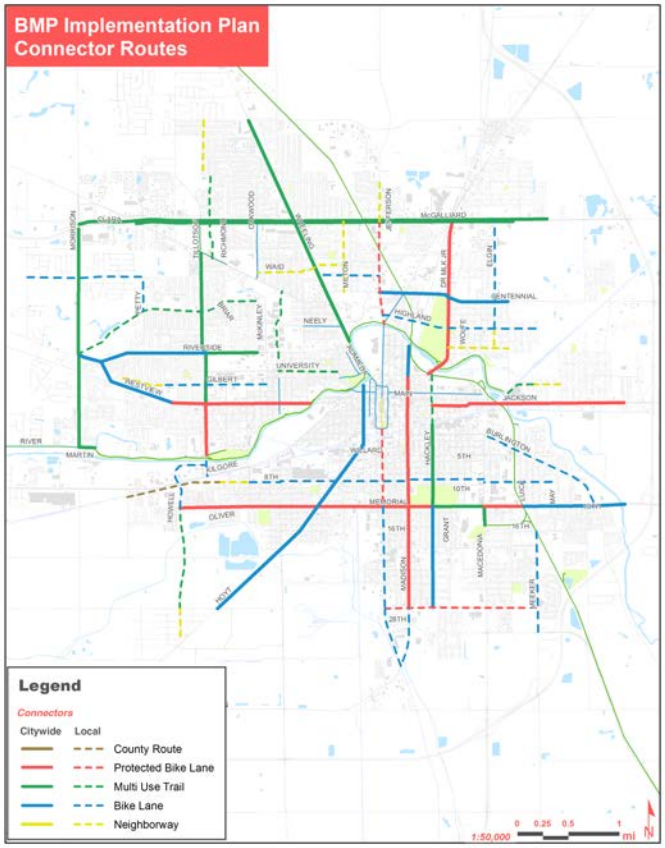


Image 13 – Map of Route Segment Connectivity. A full-sized version of this map can be found on page 46 of the implementation plan, or page 156 in the appendix of this document. *Source: author.* [231]

The connectivity score of each project was also influenced by a small weight on social connectivity. Projects segments that connect four census block groups in different equity quartiles were awarded three points, segments that connect three block groups in different equity quartiles were awarded two points, and segments that connect two block groups in different equity quartiles were given one point. Project segments that did not connect neighborhoods in different equity score quartiles, were not given points. The points for social connectivity (zero to three points possible) were then added to the points for physical connectivity (zero to seven points possible) to score each segment on a scale of zero to ten. This score, the author believes,

[231] Richard Tymczyszyn, "Muncie Bike Implementation Plan 2017-2021" Creative Project, Ball State University, 2018, Master of Urban and Regional Planning, 46.

gives priority to potentially high-traffic, city-wide connectors first, with a secondary emphasis placed on local connectors, and a tertiary emphasis place on connector routes that also serve as social connectors.

Overlap with existing plans

While the last transportation plan update process in Muncie did involve gathering community input on preferred and desired routes, a final future network was not created during the process. Additionally, while the example network proposed in this project has overlap with several other projects (the current Ball State University Bike Master Plan and the Muncie Arts and Cultural Trail, for example), these overlapping projects are self-prioritizing based on the individual project leadership, funding, and timelines associated with each.

Delaware County has, however, completed a Safe Routes to School (SRTS) plan that designates specific priority bike routes—a plan which currently does not have any system for implementation. Because these routes are already clear community priorities as established in the plan, it is important to synchronize these routes into the larger system of prioritization for implementation. There are several other reasons for including Safe Routes to School within a network-wide prioritization system—they already have local momentum and recognition, as well as federal support and potential opportunities for funding.

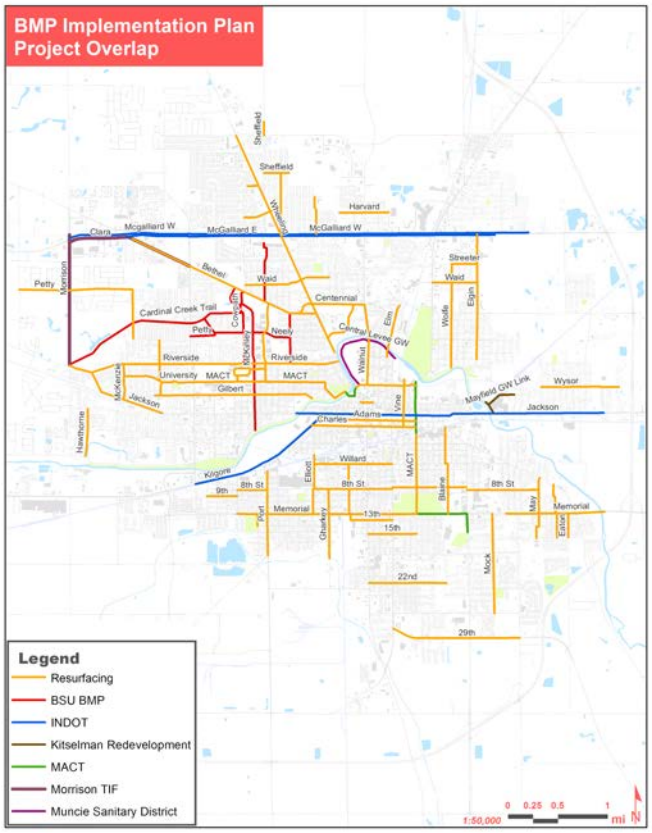


Image 14 – Map of Project Overlap. A full-sized version of this map can be found on page 49 of the implementation plan, or page 159 in the appendix of this document. *Source: author.* [232]

To calculate a priority score for overlapping with the SRTS plan, the proposed network was overlaid on top of proposed routes from the SRTS plan. Route segments that overlap with routes in the plan were given ten points. All routes within a 1/2 mile buffer of *any* school—including high schools and non-district affiliated schools, both of which are excluded from SRTS—were awarded five points in order to take into consideration important school routes that are excluded from SRTS funding options.[233]

[232] Richard Tymczyszyn, "Muncie Bike Implementation Plan 2017-2021" Creative Project, Ball State University, 2018, Master of Urban and Regional Planning, 49.
[233] It is worth noting here that Safe Routes to School planning and implementation is currently in flux, as Muncie School Corporation struggles with closures due to budget cuts and demographic fluctuations.

These segments were then displayed on a map, as can be seen on page 45 of the implementation plan, or page 155 in the appendix of this document.

Prioritization Tiers

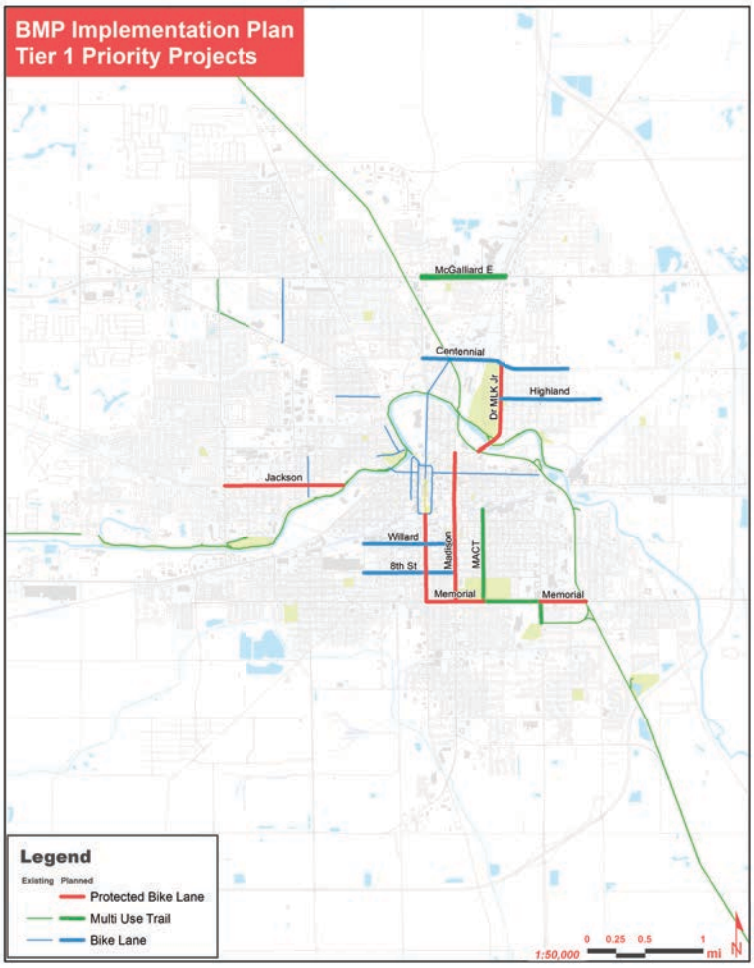


Image 15 – Map of Tier 1 Priority Projects. A full-sized version of this map can be found on page 40 of the implementation plan, or page 150 in the appendix of this document. *Source: author.* [234]

The final priority score was calculated by adding each segment score for equity, connectivity, and SRTS overlap—resulting in a final score of zero to thirty. These scores were then listed and organized by quintile to create five priority tiers—with *Tier 1* representing the

[234] Richard Tymczyszyn, "Muncie Bike Implementation Plan 2017-2021" Creative Project, Ball State University, 2018, Master of Urban and Regional Planning, 40.

highest priority projects and *Tier 5* representing the lowest priority projects. Segments in each tier were then displayed on separate maps—one for each tier—as can be seen on pages 40 to 44 of the implementation plan, or pages 150 to 154 in the appendix of this document.

Project Lists

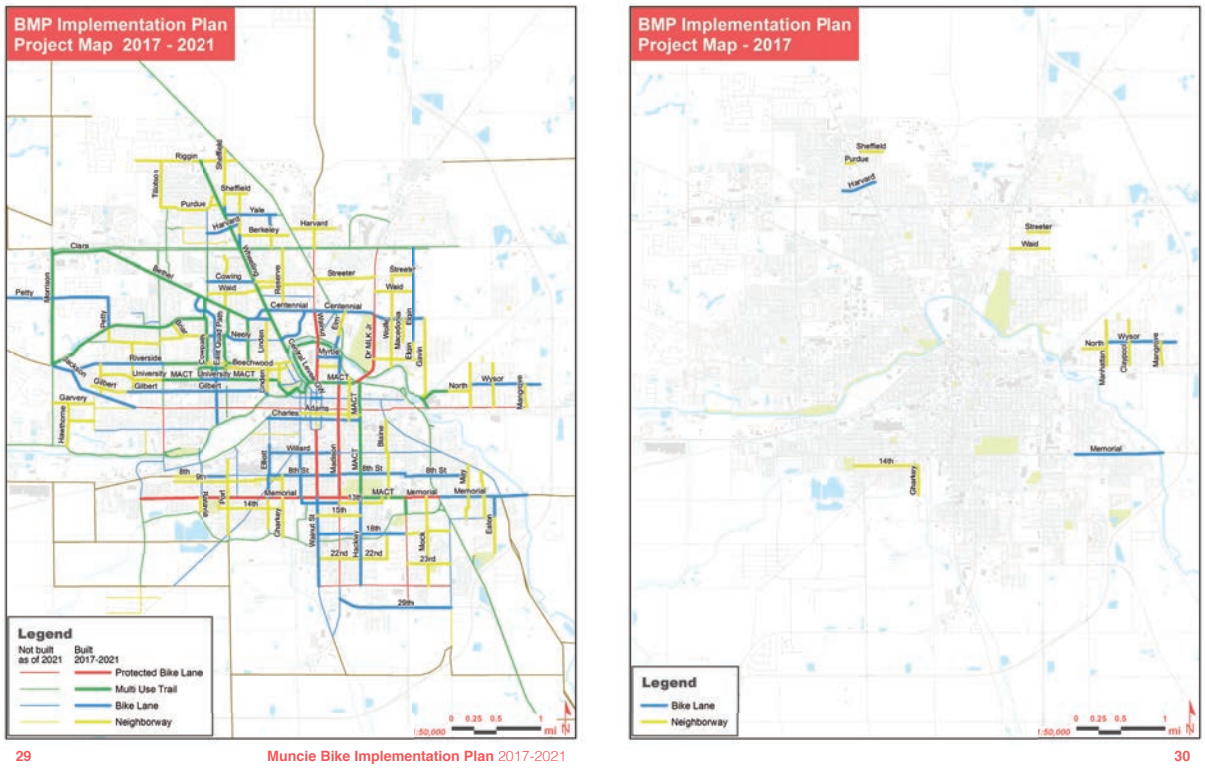
The project list is arguably the most important and utilitarian aspect of the implementation plan. While other sections of the plan outline the process for accomplishing implementation goals, the project list is meant to be used as a regular reference for what projects are supposed to reach construction and when. In short, the project list serves as an action plan for involved parties to reference during the implementation process. Especially in cities like Muncie where interdepartmental communication has been an issue in the past, having one single consolidated list of projects shared across departments is an absolutely vital aspect of efficient implementation.

While the project list itself is designed to be straightforward and easy to reference, creating a project list requires a specific order of operations based on the implementation methods employed. Having recently updated the Louisville, Kentucky's implementation plan, Bicycle and Pedestrian Coordinator Rolf Eisinger explained the necessary steps of creating a project list to the author during a conversation at the 2016 Indiana Bike Walk Summit.[235] Eisinger explained that the project list generally must start with an established map of a future bicycle network—preferably created through a community-driven bike master planning process.[236] Project segments that already have established implementation dates, or segments that overlap with roadway projects with projected constructions dates (projects that coincide with

[235] Eisinger, Rolf. "Intersession Interview, 2016 Indiana Bike Walk Summit." Interview by author. August 30, 2016.
[236] Ibid.

repaving or other development projects, for example), are then listed by project fiscal year.[237] This process incorporates bicycle projects into existing and future roadway and development projects early on in the implementation planning process, as is suggested by FHWA's *Incorporating On-Road Bicycle Networks into Resurfacing Projects*.[238] After listing the segments with implementation overlap by fiscal year, the next step is to look at financial capacity and funding opportunities for each fiscal year, filling in each yearly list with projects based on network continuity, priority, and funding/partnering options.[239] The author followed this process to generate example yearly project lists using Esri ArcGIS and Microsoft Excel, highlighting the process details below.

[237] Ibid.
[238] *Incorporating On-Road Bicycle Networks into Resurfacing Projects* (Washington DC: U.S. Department of Transportation, Federal Highway Administration, 2016), 7.
[239] Ibid.



Images 16 & 17 – Proposed Future Network Map (left) and 2017 Project Map. Full-sized versions of these maps can be found on pages 29 and 30 of the implementation plan, or page 139 and 140 in the appendix of this document. *Source: author.* [240]

While the project listing process generally must start with an established future bike network, no such network exists for Muncie. Although past planning efforts have called upon input from local residents and the cycling community to identify used and desired cycling routes throughout the county, these route maps have never been converted into an officially adopted network for future implementation. Instead, these maps and lists of routes have been kept by the Bicycle Pedestrian Advisory Committee and Delaware Muncie Metropolitan Plan Commission for use as a loose suggestion of where bicycle infrastructure could or should be built. While the adoption of an official network map is a primary objective of the current *Muncie Delaware*

[240] Richard Tymczyszyn, "Muncie Bike Implementation Plan 2017-2021" Creative Project, Ball State University, 2018, Master of Urban and Regional Planning, 29-30.

Bicycle Master Plan, such a network has yet to be officially adopted as of the time this paper was completed in early 2018.

Because of this, the author created a draft network map in order to move forward with creating a framework that may be used as an example for future implementation. This map was manually generated in ArcGIS by the author based on community input from past planning efforts, and was edited to reflect what the author and Bicycle Pedestrian Advisory Committee chair Kyle Johnson believe will be the likely future network proposed in the *Muncie Delaware Bicycle Master Plan*. After creating the draft network map, the author split each bicycle route into project segments, listing each segment by name, project extents, segment length, facility type, and prioritization tier.

The author then listed each project segment by implementation method. This process began with mapping other roadway and overlapping projects, including the Muncie Arts and Cultural Trail, the Ball State University Bicycle Master Plan, the Morrison TIF district trails project, the Kitselman Project, the Wheeling reconstruction project, and an example roadway resurfacing schedule from the Streets Department.[241] The author then listed which parties, individuals, or organizations should be involved in each segments with project overlap based on the parties involved with each corresponding project, inputting that data as its own *coordination* field.

Project segments that do not overlap with other reconstruction projects were then assigned Quick Builds as an implementation method as per the author's recommendations in the

[241] Because the Muncie Streets Department is moving to an automated, LIDAR based system for assessing roadway condition and resurfacing schedules, no future resurfacing schedules or lists were available at the time this paper was written. The author used the Department's past five years of resurfacing schedules in this project in order to create an example system for project listing that reflects the actual capacity of the Muncie Streets Department. Once current resurfacing schedules are released, this plan may be easily updated with the current data for actual use as a project list.

Project Delivery and Implementation section of the plan. Each of these Quick Build projects was additionally subcategorized by infrastructure type, with Quick Build Stripe signifying segments that require nothing more than paint for implementation, and Quick Build NW signifying neighborway segments that require any combination of painted sharrows, bike route signs, traffic calming devices for implementation.[242] Protected bike lanes that do not overlap with other projects for implementation were categorized as Quick Build Pilot, signifying pilot projects that should be initially built with painted buffers or removable traffic control devices such as flex posts, and slowly converted to hardscape or curb-protected bike lanes as future funding becomes available.

The author then calculated cost-estimates for each segment based on project length and facility type, and implementation method using baseline cost-estimates from FHWA guides *Incorporating On-Road Bicycle Networks into Resurfacing Projects* and *Costs for Pedestrian and Bicyclist Infrastructure Improvements.*[243] These guides are commonly used by bicycle and pedestrian planners for project cost-estimates, providing actual high, low, and average project costs for different bike infrastructure project types from hundreds of different example sources across the nation. The author used these cost-estimate guidelines to calculate projected costs for each segment, inputting that data into the master list table. Note that project segments that are to be implemented through resurfacing coordination do not show a project cost as the costs for these segments are tucked into the regular resurfacing budget. Thus, the cost estimated displayed

[242] For complete definitions of neighborway, sharrow, and other bicycle planning terminology used by the author in this paper, please see the Glossary of Terms section on page 161 of this document.
[243] *Incorporating On-Road Bicycle Networks into Resurfacing Projects* (Washington DC: U.S. Department of Transportation, Federal Highway Administration, 2016).; Max A. Bushell et al., *Costs for Pedestrian and Bicyclist Infrastructure Improvements; A Resource for Researchers, Engineers, Planners, and the General Public*. (Chapel Hill, NC: UNC Highway Safety Research Center & Federal Highway Administration, 2013).

in the project lists reflect the costs that must be budgeted specifically as a stand-along bicycle/pedestrian project.

Project lists for each fiscal year were then created by listing segments already scheduled for implementation, and then selecting appropriate Quick Build projects based on network connectivity, segment priority, and estimated cost. Because segments that are already scheduled for implementation are not necessarily connected to the existing bicycle network, it is important to select Quick Build projects that may act as connectors between already-scheduled projects and the existing network. This allows the City to take advantage of resurfacing and other project overlap without creating *bike lanes to nowhere*—infrastructure that is physically disconnected from the existing infrastructure network. The author executed this process by select all segments connected to scheduled projects and the existing network in ArcGIS, then listing those segments in order of priority tier. This method presents to the user a prioritized list of projects that can be embarked upon during that year along with the estimated costs, allowing the user to select as many of the top listed projects as that year's budget will allow.

Because Muncie does not have an annual budget specifically allocated for bicycle and pedestrian projects—rather, the city instead secures funding on a on a project-by-project basis—the author took the liberty of loosely estimating an annual budget for such projects. However, it is expected that the current *Delaware-Muncie Bicycle Master Plan* will create the basis for a regular budget for bicycle and pedestrian projects, as an allocated budget is necessary for its implementation. In order to keep the example implementation plan as adaptable as possible, the author deliberately populated an ambitious project list with a relatively high budget for each year, as it is easier for the Bicycle Pedestrian Advisory Committee or future Bicycle Coordinator to update the example lists through subtracting projects than through adding projects. Once an

annual budget for bicycle improvements is established after the official adoption of the *Delaware-Muncie Bicycle Master Plan*, the Bicycle Pedestrian Advisory Committee or committee chair can easily update this implementation list generation system based on established budgets.

Conclusion

Bicycle planning is difficult work. Properly engaging the community and providing a space for public input can be an expensive and arduous process. Developing buy-in and political will from local elected officials and decision makers—often in charge of both a plan's formal adoption and budget—can sometimes take more effort than the planning process itself. Finally, there is often no clear way to thread the needle between the community's vision, the technical and physical constraints inherent in the roadway's design, and the regulatory and political conditions presented by local and state-level transportation officials. Developing something like a bicycle master plan truly takes an incredible investment of work, time, funds, and hopefully—public trust.

However, the greatest fear in the hearts of planners should not be the plan that sits unfinished, but the plan that goes unimplemented. All too often are plans created only to sit on the shelf, their projects and recommendations never seeing the light of day. The reason so many plans never make it to implementation, however, is simple. In order for a plan to come to fruition—to have the impact that the planners and participating community envisioned in the planning process—it needs a system, a process, to carry it through implementation. Without a process for turning plans into action, it's unlikely that any plan could reach its full potential and create meaningful change. What's more, these processes need people behind them—people with

the will to carry out the plan, with the organization to clearly communicate and work together across sectors, and the with the structured resources to hold each other accountable.

While each document and city reviewed in this study approaches bike planning and implementation differently, each with their own unique practices and lessons, they all reinforce the need for these two central tenets of implementation—a process, and an adequately staffed team. Orcutt, McCann and Rynne, and Lagerwey all call for a clear implementation process and an equipped, accountable team as their top two necessary ingredients for successful implementation.[244] The FHWA *Resurfacing Guide* calls for a process and clear communications between members of the implementation team as two of the top ingredients for implementation.[245]

In Chicago, Illinois, a clear project delivery model and system of checklists give direction and legitimacy to a Compliance Committee and Complete Streets Manager, who are then able to enforce the city's powerful complete streets policy.[246] A separate quick build project delivery model allows the CDOT bicycle pedestrian project team to proactively implement projects from the bike master plan.[247]

In Seattle, Washington, a complete streets checklist allows SDOT to enforce the city's complete streets policy, while a project delivery model in the 2014 *Seattle Bike Master Plan* started the bicycle and pedestrian team out with clear steps towards implementation.[248] What's more, a mandated system of annually updated implementation plans helps SDOT systematically

[244] Orcutt, *Quick Builds For Better Streets,* 6-19.; McCann and Rynne, *Complete Streets: Best Policy and Implementation Practices*, 34.; Peter Lagerwey, *Creating a RoadMap for Producing & Implementing a Bicycle Master Plan*, 4-27.
[245] *Incorporating On-Road Bicycle Networks into Resurfacing Projects*, 1-18.
[246] *Complete Streets Chicago Design Guideline*, 139-140.
[247] Orcutt, *Quick Builds For Better Streets*, 11-17.
[248] *Seattle Complete Streets Ordinance*, Ordinance §122386.; *Seattle Bike Master Plan*, 94.

work towards full implementation of their desired bicycle network, monitor their progress, and adjust course as needed.[249]

In Louisville, Kentucky, an annually updated implementation plan with a strong project delivery model allows Bike Louisville to oversee the efficient implementation of the 2010 *Louisville Metro Bike Master Plan,* while the *Strategic Communications Plan* allows their small staff of two to effectively lead a series of much larger implementation teams.[250]

Finally, in Bloomington, Indiana, the most powerful provisions in the 2008 *Bicycle and Pedestrian Transportation & Greenways System Plan* were the creation of an annual implementation budget and a staffed position to guide the process.[251] While the city does not have an officially adopted project delivery model, they have employed the more organic and unconventional approach of investing in have the first step (concept development and design) of implementation completed for their next 23 projects—a sort of half-system that kick starts implementation and provides momentum.[252]

While the purpose of this document is to explore the background research, supporting arguments, and best practices for bike plan implementation—the implementation plan provided in the appendix of this document is an application of such lessons and best practices, tailored for the context of Muncie. It is the author's hope that this plan may be used as a tool—that it may be read, edited, adapted, or incorporated as it may into the city's future actions and planning efforts. As such, a copy of this plan has been provided to the Delaware Muncie Metropolitan Planning Commission, the Muncie Bicycle and Pedestrian Advisory Committee, and members of the

[249] *Seattle Bike Master Plan 2016-2020 Implementation Plan*, (Seattle, WA: Seattle Department of Transportation and Vision Zero Seattle, 2016), 5-14.
[250] *Louisville Metro's Bicycle Master Plan Project Updates 2016-2020*, 11.; *Strategic Communications Plan*, (Louisville, KY: Louisville Metro, Look Alive Louisville, Bike Louisville, 2016).
[251] *Bicycle and Pedestrian Transportation & Greenways System Plan,* iv.
[252] *Bloomington Bikeways Implementation Plan*, 3-7.

Delaware-Muncie Bicycle Master Plan steering committee for their information and consideration.

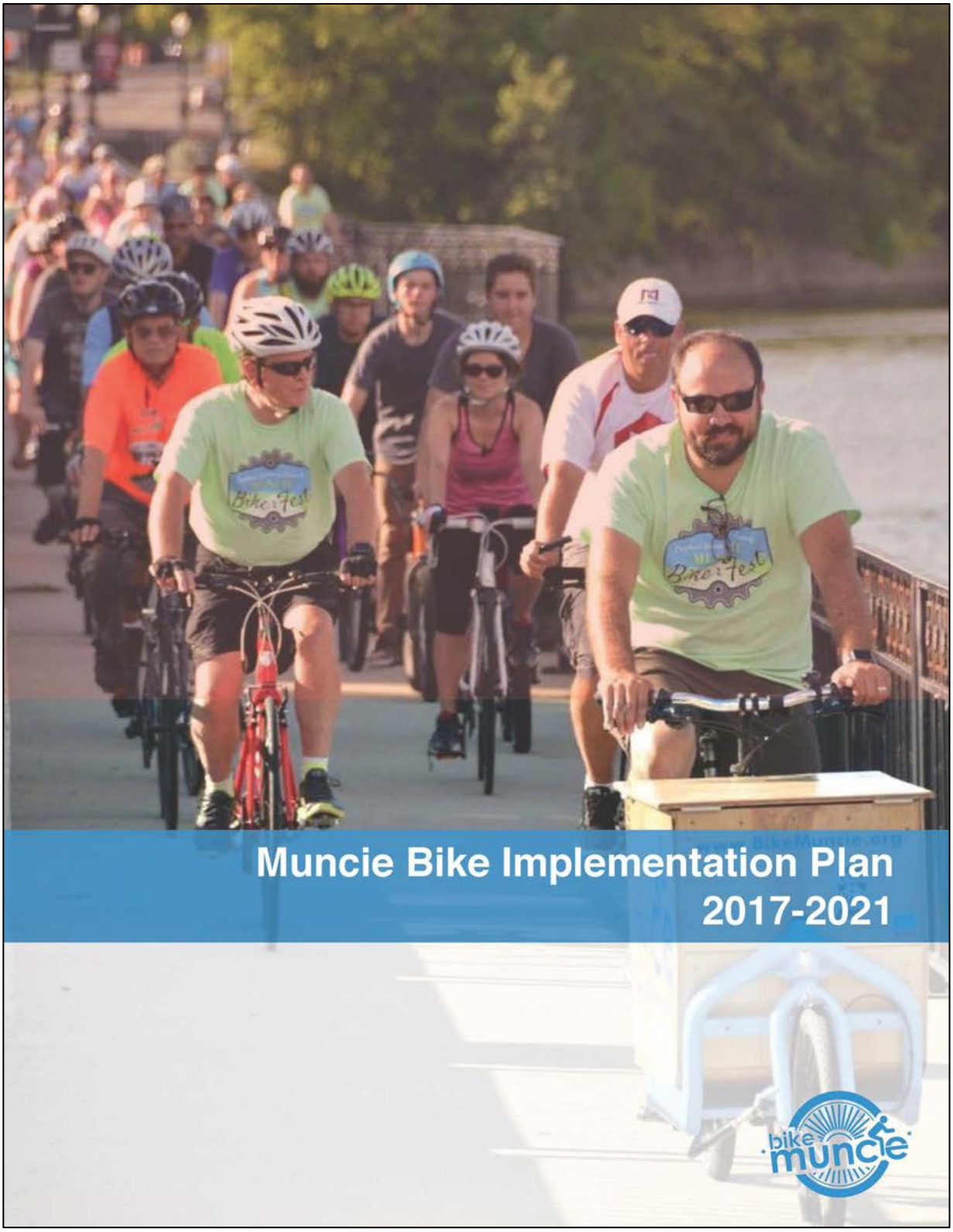
A world-class network of safe, convenient, and equitable bicycle infrastructure in Muncie is surely within reach. The city is run by an administration that understands the benefits of bicycles, with a mayor who actively shows up to meetings and events on his bike.[253] The Delaware Muncie Metropolitan Planning Commission provides an organizational home and funding source for Bike Muncie, and actively pursues such projects as the *Delaware-Muncie Bicycle Master Plan* and a jointly-funded bike share feasibility study with Ball State University. Ball State University has invested deeply in the future of cycling in Muncie, drafting the 2018 *Ball State Bicycle Master Plan* and exploring the possibilities of launching a bike share system. A team of committed advocates serves on the Muncie Bicycle and Pedestrian Advisory Committee, and die-hard volunteers donate countless hours building mountain bike trails and organizing community events like the Muncie Bike Fest. Bicycling in Muncie surely has momentum, and is ready to roll forward.

However, to adopt a bicycle master plan in Muncie without a clear implementation process and adequately staffed team is to leave the plan's implementation almost entirely to chance. While past projects like the Cardinal Greenway, White River Greenway, and downtown bike lanes are certainly marks of success that the city should celebrate, the current lack of funding and staffing capacity make the prospect of efficient implementation seem unlikely. With a clear system for communication, a full-time coordinator, and an established process for seeing each project through to success, however, the efficient build-out of a world-class bike network may be entirely attainable. For surely, in the end, the plans we create are only as strong as the tools we build to pursue them.

[253] Reference to Mayor Dennis Tyler, who has served as the Mayor of the City of Muncie, Indiana since 2012.

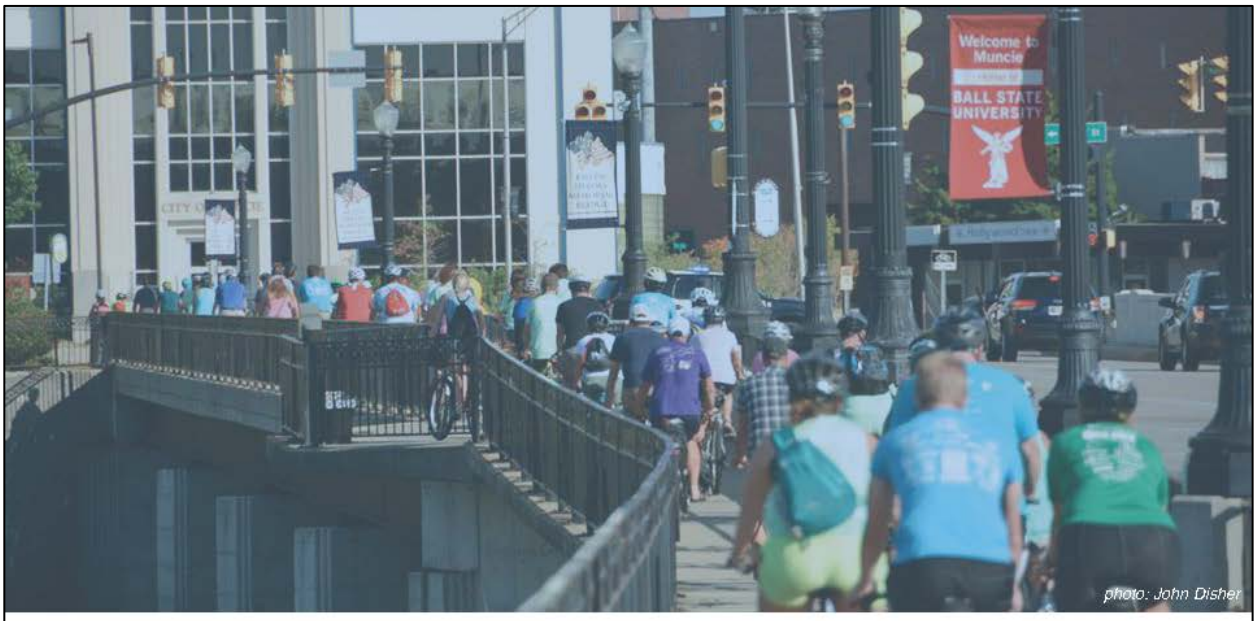
Appendix

Muncie Bike Implementation Plan 2017 - 2021



Muncie Bike Implementation Plan 2017-2021

CONTENTS



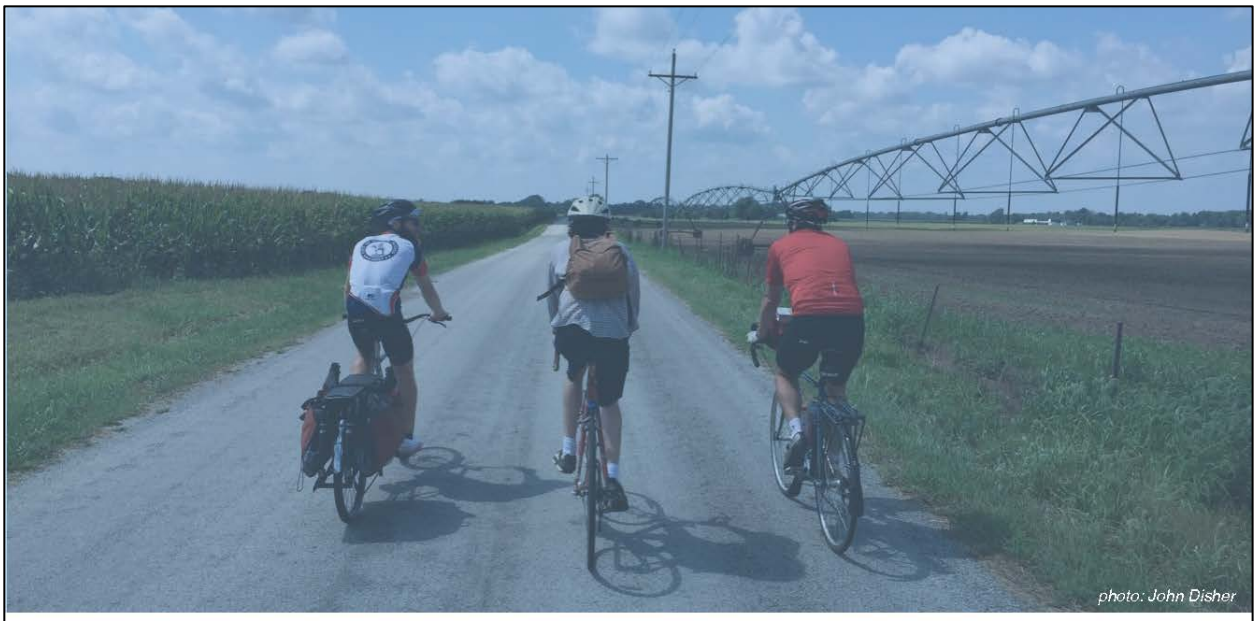
PURPOSE

Bicycling has come a long in Muncie over the past twenty years. Beginning with the origins of the Cardinal Greenway in the mid 90's, the bicycle has been increasingly gaining recognition locally as an important driver of economic, environmental, and social progress. Today, Muncie is home to the 62 mile Cardinal Greenway and White River Greenway systems, as well as over 7 miles of on-street bike lanes near downtown. Local organizations like Bike Muncie, Bicycle Pedestrian Advisory Committee, and Cardinal Greenways have a strong following of dedicated volunteers and advocates—and the city was recently recognized as a Bronze Level Bicycle Friendly Community by the League of American Bicyclists. Residents, community leaders, and elected officials alike view the development of a safe and connected bike network as a key ingredient for many community goals—from attracting visitors and retaining graduates, to promoting equity and increasing quality of life.

Moving forward, Muncie is making great strides to formalize this community momentum and plan for future growth and progress. Ball State University, seeking future recognition as Bicycle Friendly Campus, is near to completing its first ever Campus Bicycle Master Plan. Delaware County is in the early stages of building a countywide Bicycle Pedestrian Master Plan, exploring the possibility of drafting a complete streets policy, and is collaborating with Ball State University to subcontract a bikeshare feasibility study. However, while these plans may develop a vision for the future of bicycling in Muncie, there is currently no set process, governance structure, job description, or oversight mechanism to insure that these plans are implemented.

This is not a new problem, nor is it unique to Muncie. Nearly all planning and community development projects—regardless of scope, location, or access to resources—are at risk of merely "sitting on the shelf." Bicycle plans are especially at risk

However, while most municipal-level plans have a corresponding office responsible for implementation oversight (transportation plans are carried out by the Streets Department, community development plans are carried out by the Office of Community Development, comprehensive plans are followed by the Plan Commission, etc.), most cities do not have an office or team that is naturally predisposed for implementing a formal bicycle master plan. Planning organizations are often unwilling to take the



lead on coordinating large-scale projects in the right of way. Streets departments are often underfunded, understaffed, and struggling to keep up with deferred roadway maintenance alone. Transportation planners and traffic engineers are often trained to see bicycling as an obstruction of traffic, rather than a solution to it—and are understandably apprehensive to test out newer roadway treatments that are unfamiliar in the region. Finally, bike advisory committees and advocacy organizations—often the driving force behind the bicycle planning process—are generally volunteer run, underfunded, and not granted any official capacity to carry out municipal plans or handle public funding.

Often discovering this dilemma the hard way, towns and cities across the country have turned to a myriad of innovative strategies to ensure implementation of their bike plans. Some hire full-time bicycle coordination teams, while others create cross-agency teams to build collaborative responsibility. Some draft lists of detailed project goals with assigned responsibility, while others rewrite operational procedures to automatically include consistency compliance with the bike plan. No matter the strategy, creating a list of actionable goals, workflow processes for accomplishing those goals, and a system for regularly reviewing progress is imperative for ensuring continued progress.

The purpose of this document is to do just that. Based on the best practices from other cities—scaled to be context appropriate for Muncie—this document outlines suggestions for staffing, project delivery and implementation methods, funding, prioritization, and benchmarking strategies. These sections are written with the intention that they may be official adopted as implementation strategies,

Additionally, this document closes with an example model of annual project lists and maps—breaking down the length, facility type, prioritization tier, implementation method, estimated cost required, and community partners needed for coordination for each project segment. It is important to note that while this document was originally intended to be drafted after the completion of the Muncie Delaware Bicycle Pedestrian Mater Plan—allowing the project lists to be based on the actual goals and details of the plan—the plan is still in its early stages. The final projects lists and maps are therefore based upon the author's own research and calculations regarding network layout, facility type, and cost projections. However, these sections were written to serve as replicable models that may be adapted for appropriate use after the completion of the master plan.

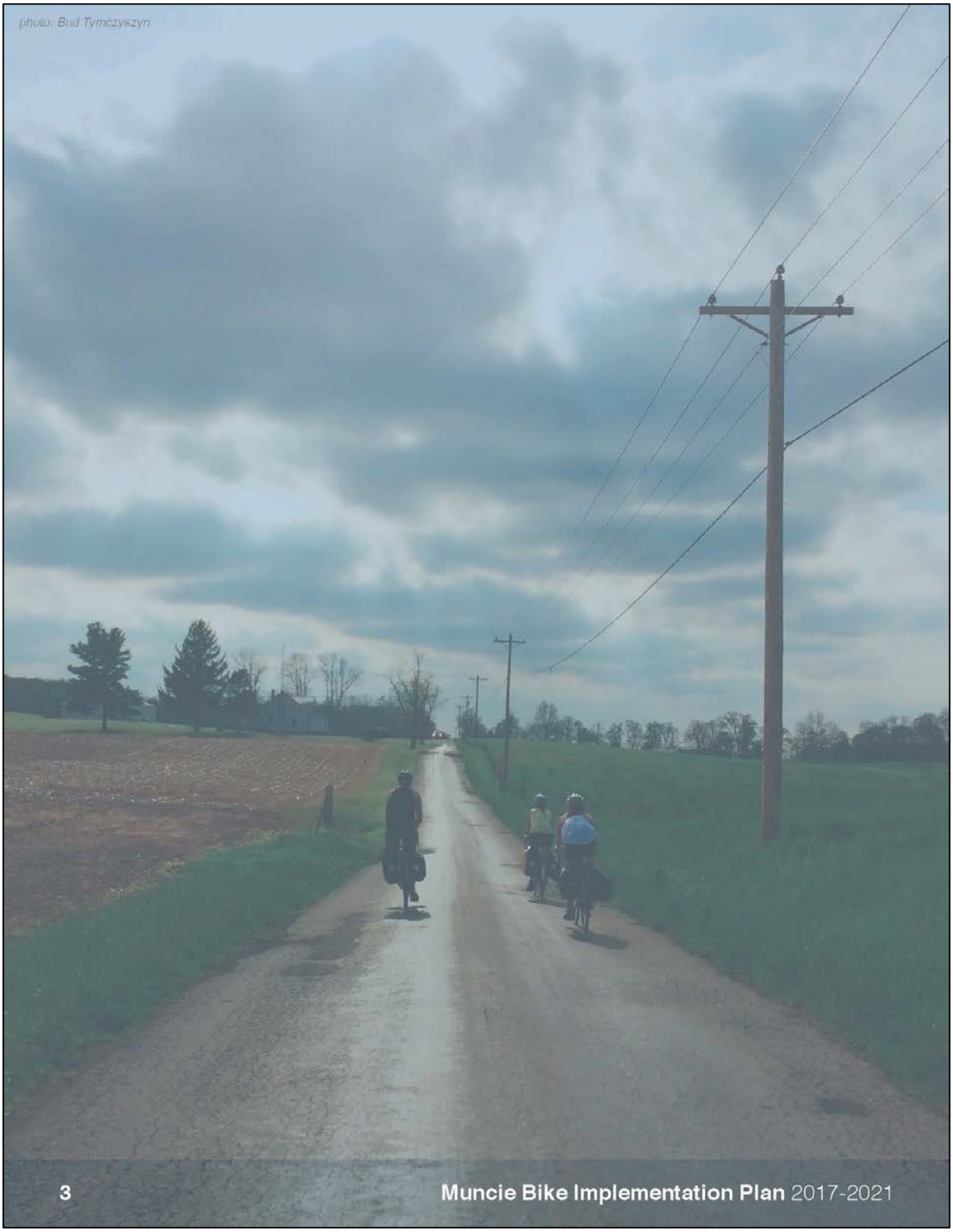


photo: Bud Tymczyszyn
3
Muncie Bike Implementation Plan 2017-2021

STAFFING

Adequate staffing is perhaps the most important component of successful and efficient bicycle plan implementation. Especially as bicycle infrastructure projects tend to require constant coordination between agencies and organizations with different operating procedures, budgets, and goals, creating a position for one person (or in larger cities, and entire team) to act as a lead coordinator is the most impactful move a city can make towards improving its bicycle infrastructure. While the Muncie Delaware Bicycle Pedestrian Master Plan will likely present a similar argument, this implementation plan calls for the hiring of a Bicycle/Pedestrian Coordinator to oversee all aspects of both program and project implementation. It is also important to note that this step is a necessary component for increasing Muncie's recognized status as a Bicycle Friendly Community from the Bronze to the Silver level.

The Bicycle/Pedestrian Coordinator is the main point of contact for all bicycle and pedestrian related projects sponsored by the city or county, and is the ultimately responsible agent for plan implementation, interagency coordination, bicycle education and outreach programs, and running public meetings. This position would ideally be housed in either the City of Muncie Streets Department, Delaware County Metropolitan Plan Commission, or jointly housed in both. As is increasingly popular in many university cities across the country, this position could also be jointly funded and housed between Ball State University and local governments. This would allow the coordinator to act as lead on public and university bicycle plan implementation, oversee the possible jointly administered bike sharing program, as well as expose the existing bicycle education and outreach programs to more established university resources.

Other staffing requirements involve the continuation of the Bicycle Pedestrian Advisory Committee. While the committee should continue to invite local advocates and volunteers to attend monthly meetings, it is of utmost importance that the committee members who are appointed by mandate through the bike ordinance (the Superintendent of the Muncie Parks and Recreation Department, the Superintendent of the Muncie Streets Department, the CEO of Cardinal Greenway, and the MPO Director) regularly attend meetings, and send a representative in instances when they cannot. Each department should be expected to provide updates on current and future bicycle related projects.

In addition to the Bicycle Pedestrian Advisory Committee, a smaller Project Action Subgroup should be formed in order focus exclusively on formulating preliminary bicycle infrastructure suggestions to be submitted to the committee and Streets Department. This subgroup would meet on an as-needed basis to assist the coordinator with specific project tasks, in addition to convening for an annual work group to review that year's repaving project list and prepare infrastructure suggestions.

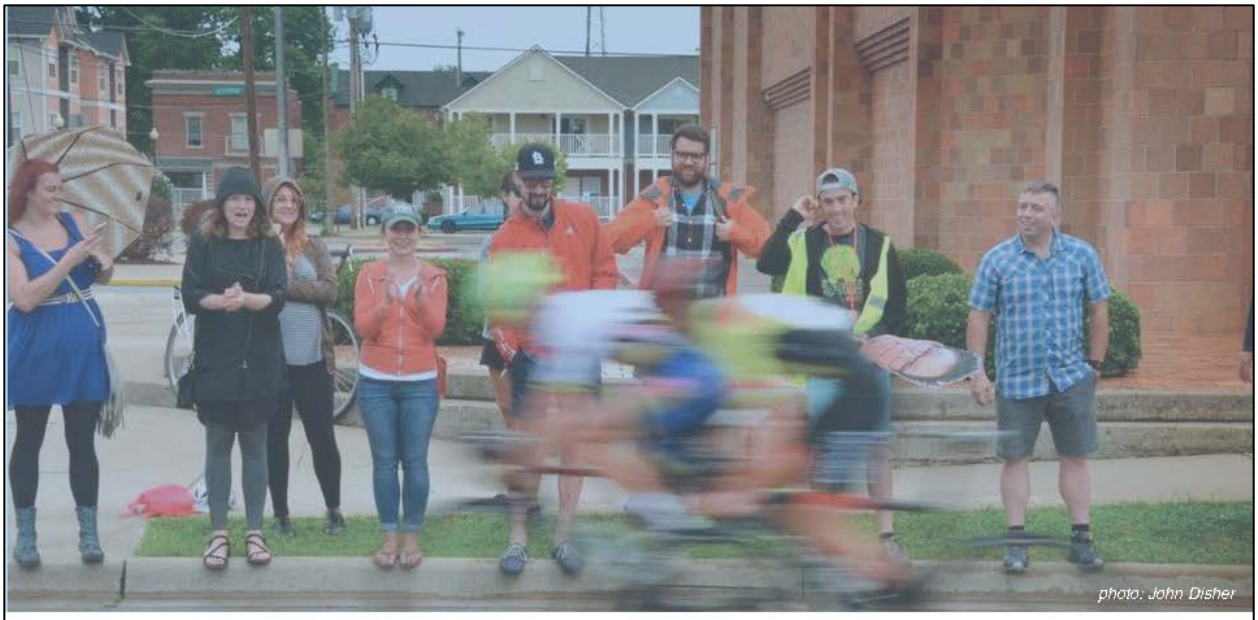
PROJECT DELIVERY & IMPLEMENTATION METHODS

While setting bike infrastructure goals through a bike master plan or complete streets policy is a formative first step, formulating a process for accomplishing those goals is necessary for implementation. Furthermore, formalizing that process allows the involved parties and public to keep track of how consistently the process has been followed, ensuring shared accountability. While the development of the current seven miles of on-street infrastructure was without a formalized process, such a process will become necessary to implement to goals established in the upcoming Muncie Delaware Bicycle Pedestrian Master Plan.

The implementation methods outlined in this plan are based on current best practices established by case studies and a review of current literature on bicycle infrastructure project delivery methods. An analysis of this research can be found in the supporting paper to this document. While the methods below are based in current research, they were adapted and scaled by the author to be context appropriate to Muncie's social, political, and financial climate. These methods include incorporation into the roadway resurfacing process, the increasingly popular quick build method, and coordination with other roadway projects. The common thread across these methods is a heavy focus on coordination and project overlap in order to increase efficiency while reducing labor, time, and cost.

The Resurfacing Model

The most labor efficient and cost-effective way to design and build on-road bicycle facilities is time them to coincide with other roadway improvement projects that already have staffing and funding resources. In Muncie, as in most US cities, regular roadway resurfacing covers drastically more linear miles of our street network than any other type of public works projects. On top of that, roadway resurfacing is already streamlined, with set processes for planning, jurisdictional approval, engineering, and construction already in place. By overlaying the future network envisioned in the Delaware Muncie Bicycle Pedestrian Master Plan with annual resurfacing projects, we can effectively "piggyback" a significant portion of the network onto roadway projects that are already staffed.

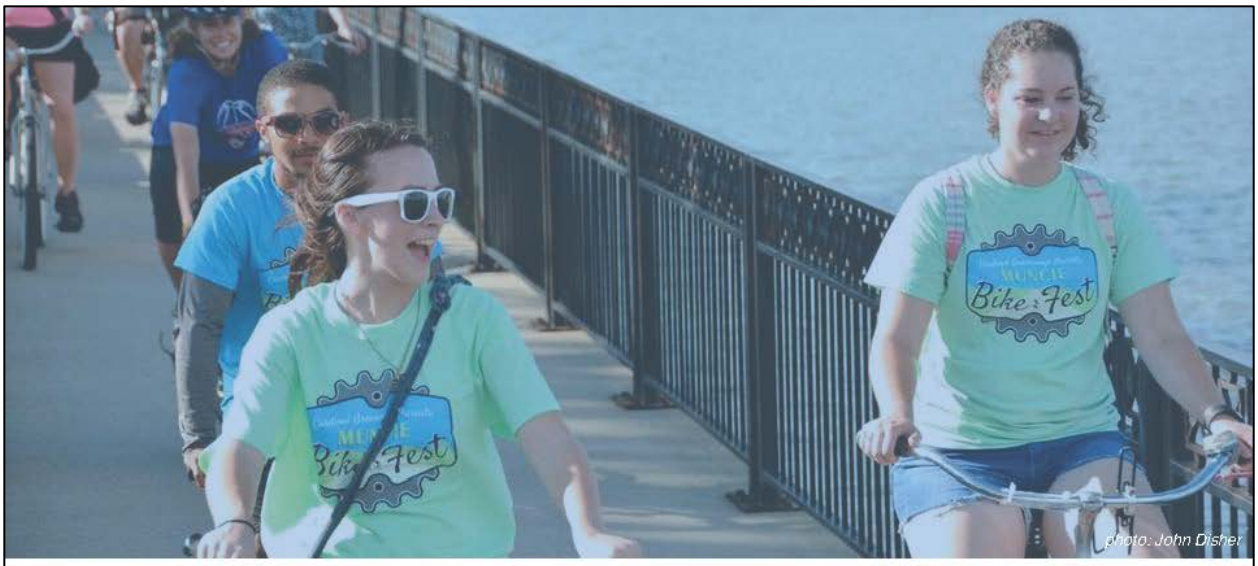


This, however, may be easier said than done—as many municipalities have struggled to include their bicycle and pedestrian projects in their resurfacing processes in an efficient or effective way. Responding to this need, the Federal Highway Administration published a groundbreaking 2016 report titled Incorporating On-Road Bicycle Networks into Resurfacing Projects, aimed at helping municipalities to edit their repaving implementation processes to more seamlessly involve bicycle and pedestrian projects without undue added labor.

The advice included in the report that may be most useful to Muncie relates to workflow timing. Incorporating bike infrastructure into the process during the implementation, engineering, and plan preparation phase leaves too little time to go through the process properly.[1] The recommended process requires a very similar workflow to that currently being used, but with advance timing to including the bicycle infrastructure review stage immediately after drafting a preliminary list of resurfacing projects.[2] While incorporating bicycle infrastructure earlier on in the process takes more proactive coordination upfront, it prevents bike infrastructure from being treaded as a project afterthought. When bike lanes are brought into a project after the final resurfacing project list is released, it often requires a reexamination of budget and reengineering of striping plans. A simple changing in timing, however, creates a significant reduction in required organizational capacity by eliminating this repeated labor. This aspect of implementation is key in a city like Muncie, where involved parties are already working at or beyond funding and labor capacity.

Perhaps the easiest way to understand this updated resurfacing process is to walk through the steps. First, Streets Department prepares a preliminary resurfacing list. While most municipal streets departments prepare this list through a manual roadway conditional inventory and analysis each year, Delaware county is fortunate enough to have recently contracted this process to the automated Transmap system—possibly allowing preliminary resurfacing lists to made more than one year in advance. After the formation of the preliminary resurfacing list the Bike Action Group overlays that list on top of the bicycle network proposed in the bicycle master plan. The Action Group and Advisory Committee then

1 Incorporating On-Road Bicycle Networks into Resurfacing Projects (Washington DC: U.S. Department of Transportation, Federal Highway Administration, 2016), 9.
2 Ibid, 13.



list important infrastructure details to be included in those projects, presenting that information back to the Streets Department. The Streets Department may then move forward with project as normal, adjusting budgets, seeking administrative approval, and moving towards the engineering and construction phases. The Bicycle Advisory Committee should periodically check in and offer assistance and guidance over any bicycle related questions during this process, and a Streets Department representative should attend Advisory Committee meetings to provide regular updates. This minor process update allows coordination to become more automatic, and furthermore allows bicycle infrastructure to be easily incorporated as a normal part of the resurfacing process.

One of the most important aspects of incorporating bicycle projects into the earliest stages of the resurfacing plan process is to reinforce the idea that building bike lanes and maintaining roadways share a primary goal of increasing safety for roadway users. When bicycle infrastructure developments are framed as projects that are independent from the general goals of roadway safety and maintenance they are often forced to rely upon separate funding sources and duplicated services. All too often this results in canceled or delayed projects, reduced public safety, lower quality public infrastructure, increased labor, and a higher cost to the taxpayer. By naturally incorporating bicycle infrastructure into the earliest stages of roadway maintenance and resurfacing processes, we can ensure implementation in the most cost-effective and labor efficient manor.

The Quick Build Model

The quick build method is a relatively new concept that is gaining an incredible amount of traction and popularity in the active transportation planning world. Developed in response to planners and advocates growing increasingly frustrated with slow implementation processes, high project expenses, and an institutional resistance to change, the quick build model provides an alternative implementation method designed to sidestep these issues. Sometimes referred to as the lighter quicker cheaper (LQC) implementation model, the quick build method focuses on simple and low-cost infrastructure solutions (such as paint-only projects) that can be installed immediately and change over time if needed.[3] Quick build processes are usually spearheaded by a bicycle coordinator or team, and generally rely on the concept of "institutionalized urgency" to increase project momentum.[4]

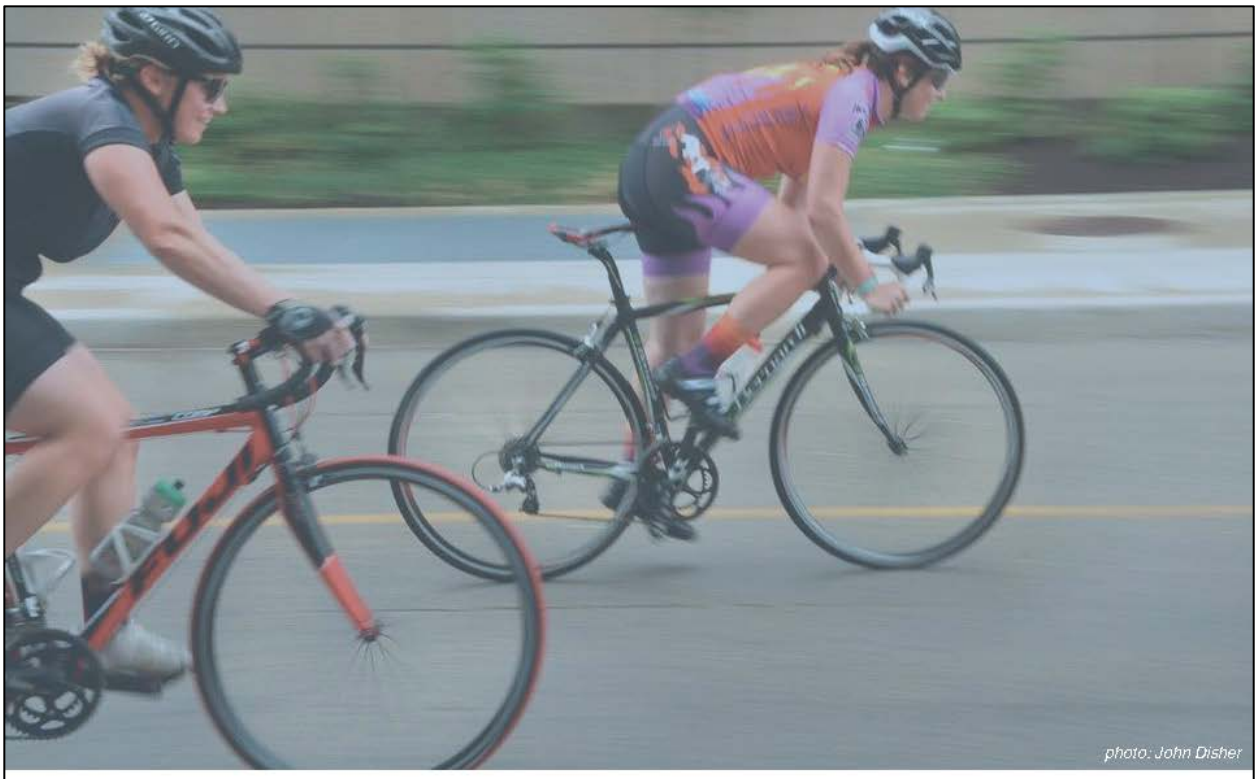
3 Jon Orcutt, Quick Builds For Better Streets: A New Project Delivery Model For U.S. Cities (Boulder, CO: PeopleForBikes, Green Lane Project, 2016), 99-100.

4 Ibid, 9.

While the quick build method is typically a popular choice for landmark and publicity-heavy projects like cross-town protected bike lanes, it may be most impactful when blended with aspects of the resurfacing model in order to quickly add light bike facilities on roadways near or adjacent to resurfacing projects. Beginning coordination of such projects early on in the resurfacing plan process would allow multiple aspects of the project to "piggyback" on the engineering, approval, and construction process of the repaving project.

In this application, much of the quick build process bears a striking resemblance to the resurfacing process. After the Streets Department produces a preliminary resurfacing list, the Bike Action Group works to identify and nearby quick build opportunities. These opportunities would be limited to simple and easily installed projects that could be accomplished with the same equipment that would be used for marking the resurfaced roadway. Example of this would include paint-only projects like adding shared lane markings to an adjacent neighborhood street or painting bike lanes into a currently over-width drive lane on a parallel route. These projects are then listing by priority tier and presented to the Streets Department. The Bicycle Advisory Committee is then responsible for discussing budget and funding options for covering the material cost of these projects, while working with Streets Department to ease as much of the installation and engineering costs as possible into the main resurfacing project budget. The Bicycle Coordinator, Advisory Committee, and Action Group must be available to provide more in-depth assistance in the form of preliminary marking drawings and coordination efforts in order to see the project through successfully.

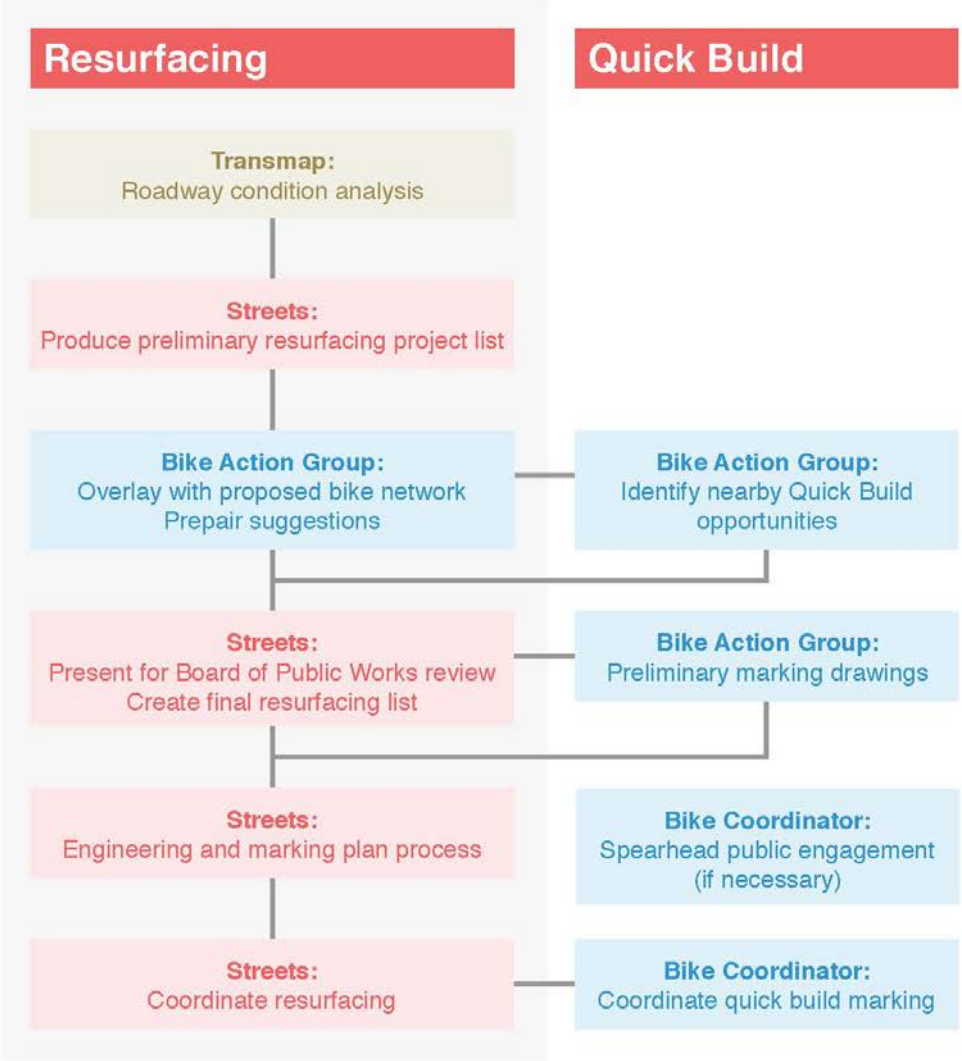
To demonstrate the methodology of quick build project selection, the author has created example yearly project lists starting on page 13. The selection methodology above was used for generating these example lists, and their proximity to resurfacing projects can be seen in the corresponding yearly project maps. To provide extra detail, quick build projects are listed as either Quick Build NW, Quick Build Stripe, or Quick Build Pilot. Quick Build NW represents traffic calming neighborway projects, which would be initially implemented through a series of shared lane markings (sharrows). As resources become available over time, these can be accompanied with bicycle route signage or traffic calming devices as appropriate. Quick Build Stripe represents quick build projects for building standard bike likes, requiring only a six inch standard stripe, bicycle marking, and standard bike lane sign. Quick Build Pilot represents future protected bike lanes, which are initially implemented as either paint-only buffered bike lanes or semi-protected lanes using temporary flex posts or simple delineators. These projects can be reexamined and converted into hard-curbed protected or vertically separated lanes at a later time, as funding or overlapping projects become available.



Project Partnering

The final implementation method of project partnering is much more ad-hoc and informal than the first two, but just as important. While independent projects and public/private partnerships require different processes for each project depending on their nature and scope, they also bring unique advantages that make bigger and more expensive projects like greenway possible. Especially when these partnerships involve additional staffing resources in the form of agencies and organizations that are able to seek out additional funding resources, the possibilities with project partnerships are huge.

As Muncie's main method for planning and building bicycle infrastructure, this method has already met a good degree of success. The 62 mile Cardinal Greenway and White River Greenway system provides us an excellent example of the possibilities involved with project partnering. By continuing current partnerships with current projects like the Ball State University Bicycle Master Plan, Muncie Arts and Culture Trail, Kitselman Energy Park Redevelopment, Morrison TIF project, and the Muncie Sanitary District levee trail, the city is creating possibilities for greenway and trail projects it likely could not afford otherwise. As with the other implementation methods, hiring a Bicycle Coordinator to assist with and create new partnerships would have a dramatic impact on the city's ability to progress its bicycle network.



Project Delivery Model

The above project delivery model graphically represents the typical workflow of both the updated re-surfacing and quick build processes. Each step of the model is color coded to represent general agency responsibility, with red representing the Streets Department, and blue representing any of the involved bicycle advocacy and oversight groups. Removing the blue altogether provides a loose representation of a typical resurfacing process, with the option incorporation of bicycle infrastructure traditionally occurring after the finalization of the resurfacing list. This model highlights coordination beginning earlier in the process, and then continuing periodically through construction.

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PRIORITIZATION

Project prioritization is an important part of the implementation process as it ensures that resources are being spent on the projects that are most important to the community and in line with established priorities. Bicycle infrastructure networks are an important investment, and an open prioritization process helps to guide that investment towards having the greatest impact. While funding opportunities and coordination with other projects ultimately influence the order of project implementation and timelines, a clear prioritization system allows up to quantifiable measure the relationship between those opportunities and our stated plan goals. Prioritization also creates an additional system for benchmarking by allowing us to look back measure whether our implementation progress reflects our original priorities.

Influenced by prioritization systems used in other bike implementation and master plans, the author has created a context sensitive route prioritization methodology for Muncie. While more detailed step-by-step instructions for repeating this methodology can be found in the supporting paper to this document, it is worthwhile to provide a brief explanation of it here. Prioritization is generally based on two characteristics—community values and data availability. Safety, equity, connectivity, and ridership are popular categories for prioritizing projects, but these may vary based on the availability of data. While many communities use crash data to measure safety and current bicycle counts to measure ridership, that data is simply not available yet in Muncie. However, available data and GIS analysis allows us to calculate scores for equity and connectivity, and overlap with existing plans like Safe Routes to School provides us with a secondary measure of priority.

Equity scores were calculated using a GIS methodology developed by Rachel Prelog and Texas A&M University for the League of American Bicyclists, and then adapted to correspond with specific infrastructure projects on a 10 point scale.[4] This method uses American Community Survey data to calculate an equity score for each census block group based on percent elderly (over 65), youth (under 18), zero-car households, percent minority population, and poverty level. Z-scores were calculated for each measure and block group for equal weighting, with the total sum making up a Bike Equity Index score for each individual block group. Each length of infrastructure was then split into shorter segments for accuracy, and each segment was assigned an equity score corresponding with the block group served by that segment. Those scores were then adjusted to fit a 0-10 point scale for equal weighting in the final prioritization system.

4 Rachael Prelog, Equity of Access to Bicycle Infrastructure: GIS Methods for Investigating the Equity of Access to Bike Infrastructure (League of American Bicyclists, 2015).

Connectivity is a multi-pronged concept that plays an important role in developing a bike network. High-traffic, city-wide connectors are arguably the most important elements of the network for enhancing transportation and creating a physically connected system. Similarly, routes that connect different neighborhoods and serve the largest diversity of riders are arguably the most important human elements of the network, creating a socially connective system. In order to incorporate both forms of connectivity into a prioritization system, the author developed a methodology for measuring route connectivity using manual spatial analysis in GIS.

First, the author manually selected city-wide connectors, usually placed along or adjacent to long collector or arterial roadways, that span city districts. These are the high-volume "across town" routes that a resident would likely end up on if riding to a destination further than a bordering neighborhood. These selected routes were given 7 points. Next, the author manually selected neighborhood connectors that do not span the city, but most directly connect unserved neighborhoods (more that ¼ mi from a city-wide connector) to city-wide connectors. These routes were given 3.5 points. Finally, bike equity block scores were used to split the city into different demographic blocks. Routes that serve four different social blocks were given three points, while serving three blocks resulted in two points, and serving two blocks resulted in one point. This allows the final prioritization score to not only consider equity, but social connectivity between different neighborhoods as well. The final connectivity scores for each project segment were added together to make a 0-10 point scale.

One factor that is often overlooked in many prioritization systems is project overlap with priorities from other plans. In Muncie, one of the most dramatic examples of this is the current Safe Routes to School (SRTS) plan. While SRTS has identified specific project streets that the community has identified as needing immediate safety improvements, there has been no formal system for implementing these updates. As nearly all of the streets identified in SRTS overlap with our proposed bike network, it's appropriate to give the identified SRTS priorities a degree of weight in our prioritization system. As such, route segments that were identified as priorities in the SRTS plan were given ten points, while route segments that were identified as lower priority school routes were given five points.

The equity, connectivity, and SRTS scores for each project segment were then added together, giving each project a priority score of 0-30. Those scores were then translated into grouped priority tiers, with the top quartile of scores grouped into Tier 1 (highest priority), second quartile into Tier 2 (high priority), etc. This system gives us an easy to understand rating system that allows us to quickly understand the different priority levels of each individual project. The priority tier of each project can be found in the project lists beginning on page 13, and are additionally mapped by tier on pages 40-44.

PROJECT LISTS

The project list section is the heart of the implementation plan. By comprehensively listing every bicycle infrastructure project that is planned to reach construction for the next five years, we can effectively begin the planning and coordination process earlier and more systematically than the current ad hoc system. Especially by making the implementation plan a shared and public document, having this list available to each involved agency, group, and the general public will help in progressing coordination, equalizing expectations, and building consensus. This list also acts as a live checklist, helping the Bicycle Pedestrian Advisory Committee and Bicycle Coordinator to maintain progress and leverage their coordination efforts. The implementation plan should be updated at the end of each year with a Project Updates List, highlighting the projects that did or did not reach the construction phase.

Each list highlights the anticipated bicycle infrastructure projects that are expected to reach the construction phase within that fiscal year. Each project is listed by its street or project name, physical extents, length, facility type, priority tier, implementation method, estimated additional cost to local government, and groups suggested for additional coordination. Estimated cost reflects the projected dollar amount that would not likely be covered under regular existing roadway funding (allocated funding for resurfacing, for example) and would require tapping into new or underutilized funding sources (CMAQ funds, for example) for completion. Each yearly list was assembled primarily based upon overlap with roadway projects that are already planned—such as regular resurfacing or public/private roadway projects—as well as appropriate Quick Build projects that were weighted by direct proximity to existing projects and priority tier. This methodology is further explained in the paper supporting this document.

Because the Muncie Delaware Bicycle Pedestrian Master Plan is still in the early stages of development, it is important to note that the following lists may not accurately reflect the specific infrastructure goals of the master plan. However, the author has developed the methodology for project listing to be easily replicable. The step-by-step instructions for replicating this project list with any changed or updated plan goals can be found in the supporting paper to this plan, which will be stored in the Ball State University Libraries Masters Theses Archives. In addition, this plan (as well as the supporting paper and all tabular and geographic data) will be given to the Bicycle Pedestrian Advisory Committee as an InDesign document which can be edited, updated, or used as a template for future Implementation Plans or Project Updates. By building this plan as a methodology and template, it is my hope that it may be useful and scalable to fit any implementation planning needs in the future.

Implementation Plan Project List - 2017

Street Name	Project Extents		Length (mi)	Facility Type	Tier	Implementation Method	Est. Cost	Coordination
Waid	Dr MLK Jr	Elgin	0.45	Neighborway	2	Resurface	$0.00	Longfellow Elementary
Sheffield	Rosewood	New York	0.25	Neighborway	3	Resurface	$0.00	SRTS Plan, Northview Elementary & Mitchell Elementary
Streeter	Wolfe	Elgin	0.25	Neighborway	3	Resurface	$0.00	
Mangrove	Jackson	Wysor	0.26	Neighborway	3	Quick Build NW	$1,861.93	
North	Leland	Manhattan	0.27	Neighborway	4	Quick Build NW	$1,926.86	
Gharkey	Ball GW	14th	0.33	Neighborway	4	Resurface	$0.00	Southview Elementary
14th	Rochester	Gharkey	0.72	Neighborway	4	Quick Build NW	$5,125.76	Southview Elementary
Purdue	Purdue	Wheeling	0.11	Neighborway	5	Resurface	$0.00	
Claypool	Jackson	Manor	0.49	Neighborway	5	Quick Build NW	$3,530.92	
Manhattan	Jackson	Manor	0.50	Neighborway	5	Quick Build NW	$3,541.44	
Memorial	CGW	Butterfield	0.99	Lane	2	Resurface	$0.00	SRTS Plan, St Law-rence & Inspire Acad.
Harvard	Oakwood	Janney	0.39	Lane	4	Resurface	$0.00	Northview Elementary
Wysor	Manhattan	Eastwood	0.78	Lane	4	Resurface	$0.00	

2017 Totals

By Facility Type

	Miles	Cost
Neighborways	3.63	$15,986.90
Lanes	2.15	$0.00
Total	**5.79**	**$15,986.90**

By Implementation Method

	Miles	Cost
Resurface	3.55	$0.00
Quick Build NW	2.24	$15,986.90
Total	**5.79**	**$15,986.90**

Implementation Plan Project List - 2018

Street Name	Project Extents		Length (mi)	Facility Type	Tier	Implementation Method	Est. Cost	Coordination
Memorial	Macedonia	CGW	0.39	Protected Lane	1	Quick Build Pilot	$33,962.15	SRTS Plan, St Lawrence & Inspire Academy
Walnut	McGalliard	Charter	0.38	Neighborway	2	Quick Build NW	$2,696.72	SRTS Plan, Northview Elementary
Eaton	16th	Mansfield Park	0.39	Neighborway	2	Quick Build NW	$2,799.02	SRTS Plan, St Lawrence & Inspire Academy
Harvard	CGW	Madison	0.49	Neighborway	2	Resurface	$0.00	SRTS Plan, Northview Elementary
Peachtree	Hawthorne	Stradling	0.28	Neighborway	3	Quick Build NW	$2,016.29	SRTS Plan, Westview Elementary
Gilbert	Chinqua-pin	Wildwood	0.42	Neighborway	3	Quick Build NW	$3,032.43	SRTS Plan, Westview Elementary
Rosewood	Bethel	McGalliard	0.61	Neighborway	4	BSU BMP	$0.00	BSU, Northside Middle
Petty	Tillotson	Cowpath	0.56	Neighborway	4	BSU BMP	$0.00	BSU, Storer Elementary
Briar	Petty	Cardinal Creek	0.17	Neighborway	4	BSU BMP	$0.00	BSU, Storer Elementary
Brentwood	Gilbert	University	0.14	Neighborway	4	Resurface	$0.00	Westview Elementary
Petty	Petty	Cardinal Creek	0.16	Neighborway	4	Resurface	$0.00	Storer Elementary
Blaine	22nd	18th	0.29	Neighborway	4	Quick Build NW	$2,042.14	
22nd	Hackley	Blaine	0.30	Neighborway	4	Resurface	$0.00	
Brentwood	University	Petty	0.41	Neighborway	4	Resurface	$0.00	Westview Elementary
Petty	Petty	Tillotson	0.57	Neighborway	4	Quick Build NW	$4,095.38	Storer Elementary
University	McKenzie	Tillotson	0.72	Neighborway	4	Resurface	$0.00	Westview Elementary
Waid	Oakwood	Reserve	0.86	Neighborway	4	Resurface	$0.00	Northside Middle
Adams	Kilgore	Hackley	0.98	Neighborway	4	Resurface	$0.00	
Rochester	14th	Memorial	0.12	Neighborway	5	Resurface	$0.00	
9th	Clark	Batavia	0.30	Neighborway	5	Resurface	$0.00	
Roosevelt	Reserve	Walnut	0.35	Neighborway	5	Quick Build NW	$2,470.57	
Garvery	Morrison	Stradling	0.46	Neighborway	5	Quick Build NW	$3,314.19	
Hawthorne	River	Garver	0.48	Neighborway	5	Resurface	$0.00	
Reserve	Centennial	McGalliard	0.69	Neighborway	5	Quick Build NW	$4,957.46	

9th	Batavia	Gharkey	0.93	Neighborway	5	Quick Build NW	$6,610.61	
Centennial	Elgin	Gavin	0.13	Lane	1	Quick Build Stripe	$4,093.57	Longfellow Elementary
Centennial	Walnut	Elgin	1.15	Lane	1	Quick Build Stripe	$36,692.91	SRTS Plan, Longfellow Elementary
Petty	Cardinal Creek	Petty	0.34	Lane	2	Resurface	$0.00	SRTS Plan, Storer Elementary
Charles	Kilgore	Hackley	1.04	Lane	2	Resurface	$0.00	SRTS Plan, East Washington Academy
8th St	Madison	Macedonia	0.74	Lane	3	Resurface	$0.00	
Eaton	Memorial	16th	0.24	Lane	4	Resurface	$0.00	St Lawrence & Inspire Academy
8th St	Macedonia	May	0.72	Lane	4	Resurface	$0.00	
29th	Walnut	Meeker	1.29	Lane	4	Resurface	$0.00	Grissom Elementary & Southside Middle
Neely	Cowpath	New York	0.47	Lane	5	BSU BMP	$0.00	BSU
MACT	South Trailhead	Hackley	0.69	MU Trail	1	MACT	$0.00	MACT Team, Flatland, SRTS Plan, Southview, Grissom, Sutton
MACT	Seymour	Dr MLK Jr	0.53	MU Trail	2	MACT	$0.00	MACT Team, Flatland, SRTS Plan, East Washington Academy
Cowpath	Riverside	Bethel	0.75	MU Trail	4	BSU BMP	$0.00	BSU, Northside Middle, Burris IND
Central Levee GW	Wysor	CGW	1.06	MU Trail	4	MSD project	$0.00	MSD, Flatland, Muncie Central High
New York	Riverside	Bethel	0.50	MU Trail	5	BSU BMP	$0.00	BSU
MACT	High	White River	0.21	MU Trail	5	MACT	$0.00	MACT Team, Flatland

2018 Totals

By Facility Type

	Miles	Cost
Protected Lanes	0.39	$33,962.15
Neighborways	11.06	$34,034.82
Lanes	6.12	$40,786.47
MU Trail	3.74	$0.00
Total	**21.32**	**$108,783.45**

By Implementation Method

	Miles	Cost
Resurface	9.33	$0.00
Quick Build NW	4.77	$34,034.82
Quick Build Stripe	1.27	$40,786.47
Quick Build Pilot	0.39	$33,962.15
MSD project	1.06	$0.00
BSU BMP	3.07	$0.00
MACT	1.43	$0.00
Total	**21.32**	**$108,783.45**

Implementation Plan Project List - 2019

Street Name	Project Extents		(mi)	Facility Type	Tier	Implementation Method	Est. Cost	Coordination
Memorial	Walnut	Hackley	0.49	Protected Lane	1	Resurface	$0.00	SRTS Plan, Southview Elementary
Madison	Kirby	Wysor	0.54	Protected Lane	1	Quick Build Pilot	$47,092.78	SRTS Plan, East Washington Academy
Madison	Memorial	Kirby	0.75	Protected Lane	1	Quick Build Pilot	$65,154.77	SRTS Plan, Southview & East Washington Academy
Memorial	Hoyt	Walnut	0.64	Protected Lane	2	Resurface	$0.00	SRTS Plan, Southview Elementary
Memorial	Batavia	Hoyt	0.67	Protected Lane	2	Resurface	$0.00	SRTS Plan, Southview Elementary
Walnut	McCulloch	Centennial	0.32	Protected Lane	4	Resurface	$0.00	Muncie Central High
Walnut	Wysor	McCulloch	0.50	Protected Lane	4	Resurface	$0.00	Muncie Central High
Memorial	Tillotson	Batavia	0.68	Protected Lane	4	Quick Build Pilot	$59,465.33	
Macedonia	Highland	Centennial	0.26	Neighborway	2	Quick Build NW	$1,873.76	SRTS Plan, Longfellow Elementary & EWA
Gavin	Bunch	Centennial	0.91	Neighborway	2	Quick Build NW	$6,468.48	Longfellow Elementary
Wolfe	Bunch	Streeter	1.04	Neighborway	2	Resurface	$0.00	Longfellow Elementary
Sutton NW	Burlington	16th	0.56	Neighborway	3	Resurface	$0.00	SRTS Plan, St Lawrence & Inspire
Riverside	New York	Wheeling	0.48	Neighborway	4	Resurface & BSU	$0.00	BSU
Batavia	Ball GW	Memorial	0.16	Neighborway	4	Quick Build NW	$1,117.57	
Riverside	Cowpath	Martin	0.21	Neighborway	4	Resurface	$0.00	Burris & IND Academy
Columbus	Walnut	Madison	0.25	Neighborway	4	Quick Build NW	$1,809.63	Muncie Central High
Elliott	17th	Memorial	0.28	Neighborway	4	Quick Build NW	$2,019.12	Southview Elementary
McKenzie	Westview	Riverside	0.36	Neighborway	4	Resurface	$0.00	Westview Elementary
Linden	Riverside	Bethel	0.50	Neighborway	4	Quick Build NW	$3,603.87	
13th	Madison	Penn	0.54	Neighborway	4	Quick Build NW	$3,877.90	
May	Burlington	16th	0.64	Neighborway	4	Resurface	$0.00	St Lawrence & Inspire Academy
Streeter	Walnut	Dr MLK Jr	0.69	Neighborway	4	Quick Build NW	$4,945.12	
Beechwood	Martin	Alameda	0.71	Neighborway	4	Quick Build NW	$5,051.51	Burris & IND Academy
Reserve	University	Riverside	0.18	Neighborway	5	Quick Build NW	$1,316.41	
8th	Clark	Batavia	0.30	Neighborway	5	Quick Build NW	$2,152.21	
Linden	WhiteRiver	Riverside	0.35	Neighborway	5	Quick Build NW	$2,471.72	

22nd	Walnut	Hackley	0.48	Neighborway	5	Resurface	$0.00	
8th St	Elliott	Madison	0.78	Lane	1	Resurface	$0.00	SRTS Plan, Southview Elementary
Liberty	Memorial	Willard	0.51	Lane	2	Resurface	$0.00	SRTS Plan, Southview Elementary
Jackson	Morrison	Westview	1.10	Lane	2	Resurface	$0.00	SRTS Plan, Westview Elementary
Gilbert	Wildwood	Tillotson	0.39	Lane	3	Resurface	$0.00	SRTS Plan, Westview Elementary, St Mary's
13th	Liberty	Madison	0.48	Lane	3	Resurface	$0.00	SRTS Plan, Southview Elementary
Riverside	Jackson	Tillotson	1.04	Lane	3	Resurface	$0.00	Westview Elementary
University	Talley	Martin	0.28	Lane	4	Resurface & BSU BMP	$0.00	BSU, St Mary's Elementary, Burris IND
8th St	Batavia	Port	0.30	Lane	5	Resurface	$0.00	
MACT	Memorial	Seymour	0.80	MU Trail	1	Resurface & MACT	$0.00	MACT Team, Flatland, SRTS Plan, Southview, East Washintong Academy
Riverside	Tillotson	Cowpath	0.50	MU Trail	2	Resurface & BSU BMP	$0.00	BSU, SRTS Plan, Burris & IND Academy
Morrison	Jackson	McGalliard	1.23	MU Trail	3	Morrison TIF	$0.00	Morrison TIF Team
East Quad Path	Beech-wood	Bethel	0.68	MU Trail	3	Resurface & BSU BMP	$0.00	BSU, Burris & IND Academy
MACT	Reserve	Martin	0.60	MU Trail	3	Resurface & MACT	$0.00	MACT Team, Flatland, Burris & IND Academy
MACT	Martin	Campus	0.71	MU Trail	4	Resurface & MACT	$0.00	MACT Team, Flatland, St Mary's Ele-mentary, Burris IND
MACT	Campus	Tillotson	0.50	MU Trail	4	Resurface & MACT	$0.00	MACT Team, Flatland, St Mary's Ele-mentary, Burris IND
Mayfield GW Link	Bunch	North	0.29	MU Trail	5	Kitselman	$0.00	Kitselman Project Team
WRGW Jackson Gap	Gavin	Jackson	0.14	MU Trail	5	Kitselman	$0.00	Kitselman Project Team
Clara	Morrison	Timber	0.71	MU Trail	5	Morrison TIF	$0.00	Morrison TIF Team
Riverside	Martin	New York	0.25	MU Trail	5	Resurface & BSU BMP	$0.00	BSU
MACT	White River	University	0.32	MU Trail	5	Resurface & MACT	$0.00	

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2019 Totals

By Facility Type

	Miles	Cost
Protected Lanes	4.58	$171,712.88
Neighborways	8.91	$36,707.30
Lanes	4.89	$0.00
MU Trail	6.73	$0.00
Total	**25.10**	**$208,420.19**

By Implementation Method

	Miles	Cost
Resurface	10.50	$0.00
Quick Build NW	5.14	$36,707.30
Quick Build Pilot	1.97	$171,712.88
BSU BMP	2.19	$0.00
MACT	2.92	$0.00
Morrison TIF	1.94	$0.00
Kitselman	0.44	$0.00
Total	**25.10**	**$208,420.19**

Implementation Plan Project List - 2020

Street Name	Project Extents		Length (mi)	Facility Type	Tier	Implementation Method	Est. Cost	Coordination
Dr MLK Jr	Hackley	Centennial	0.84	Protect. Lane	1	Quick Build Pilot	$73,163.51	SRTS Plan, Longfellow E. & EWA
Cowing P.	McGalliard	Harvard	0.24	Neighborway	3	Resurface	$0.00	SRTS Plan, Northview Elementary
Berkeley	Janney	Milton	0.54	Neighborway	3	Quick Build NW	$3,887.82	SRTS Plan, Northview Elementary
Lowell	Dr MLK Jr	Gavin	0.59	Neighborway	3	Quick Build NW	$4,238.79	
Mock	28th	Memorial	1.00	Neighborway	3	Resurface	$0.00	SRTS Plan, Grissom, S.side, Inspire
Elliott	18th	17th	0.06	Neighborway	4	Quick Build NW	$413.13	Southview Elementary
Gharkey	14th	8th	0.37	Neighborway	4	Resurface	$0.00	Southview Elementary

Janey	Berkeley	Sheffield	0.47	Neighborway	4	Resurface	$0.00	Northview Elementary
23rd	Macedonia	Meeker	0.50	Neighborway	4	Quick Build NW	$3,564.63	Grissom Elementary & S.side Middle
18th	Macedonia	Meeker	0.53	Neighborway	4	Quick Build NW	$3,754.35	St Lawrence & Inspire Academy
Elm	Highland	Centennial	0.27	Neighborway	5	Resurface	$0.00	
Willard	Elliott	Madison	0.78	Lane	1	Resurface	$0.00	SRTS Plan, Southview Elementary
Madison	Wysor	Myrtle	0.28	Lane	2	Quick Build Stripe	$9,066.80	Muncie Central High
Hackley	18th	Memorial	0.41	Lane	2	Quick Build Stripe	$13,174.51	SRTS Plan, S.view, Grisson, & S.side
Hackley	28th	18th	0.58	Lane	2	Quick Build Stripe	$18,681.69	SRTS Plan, Grissom E & Sside Mid
Elgin	Highland	McGalliard	1.06	Lane	2	Resurface	$0.00	SRTS Plan, Longfellow Elementary
McKinley	Wht River	University	0.49	Lane	3	BSU BMP	$0.00	BSU, St Mary's Elementary, Burris
Cowing Park	Harvard	Yale	0.14	Lane	3	Resurface	$0.00	SRTS Plan, Northview Elementary
Elm	Myrtle	Highland	0.25	Lane	3	Resurface	$0.00	SRTS Plan, Muncie Central High
18th	Walnut	Hackley	0.48	Lane	3	Quick Build Stripe	$15,409.13	SRTS Plan, Southview Elementary
Gilbert	McKinley	Linden	0.59	Lane	3	Resurface	$0.00	St Mary's Elementary, Burris IND
Gilbert	Tillotson	McKinley	0.60	Lane	3	Resurface	$0.00	Westview El, St Mary's, Burris IND
McKinley	University	Bethel	1.10	Lane	4	BSU BMP	$0.00	BSU, Northside Middle, Burris IND
Myrtle	Walnut	Madison	0.25	Lane	4	Quick Build Stripe	$8,126.55	Muncie Central High
Washington	High	Mulberry	0.12	Lane	5	Resurface	$0.00	
18th	Hackley	Macedonia	0.52	Lane	5	Quick Build Stripe	$16,594.36	
Elliott	Memorial	Willard	0.61	Lane	5	Resurface	$0.00	
CCreek Trail	Morrison	Cowpath	1.91	MU Trail	3	BSU BMP	$0.00	BSU, Storer Elementary
MACT	Hackley	High	0.61	MU Trail	4	Resurface & MACT	$0.00	MACT Team, Flatland, East Washington Academy & Muncie Central High

2020 Totals

By Facility Type

	Miles	Cost
Protected Lanes	0.84	$73,163.51
Neighborways	4.58	$15,858.73
Lanes	8.28	$81,053.03
MU Trail	2.51	$0.00
Total	**16.21**	**$170,075.27**

By Implementation Method

	Miles	Cost
Resurface	6.51	$0.00
Quick Build NW	2.22	$15,858.73
Quick Build Pilot	0.84	$73,163.51
Quick Build Stripe	2.53	$81,053.03
BSU BMP	3.50	$0.00
MACT	0.61	$0.00
Total	**16.21**	**$170,075.27**

Implementation Plan Project List - 2021

Street Name	Project Extents		Length (mi)	Facility Type	Tier	Implementation Method	Est. Cost	Coordination
Walnut St	Seymour	Memorial	0.76	Protect. Lane	1	Quick Build Pilot	$65,749.35	SRTS Plan, Southview Elementary
Elgin	Lowell	Highland	0.19	Neighborway	2	Resurface	$0.00	Longfellow Elementary
Tillotson	Purdue	Riggin	0.53	Neighborway	2	Quick Build NW	$3,786.66	SRTS Plan, Mitchell Elementary
Blaine	Memorial	Ohio	0.90	Neighborway	2	Resurface	$0.00	SRTS Plan, East Washington Acad.
Purdue	Tillotson	Wheeling	0.73	Neighborway	3	Quick Build NW	$5,202.48	SRTS Plan, Mitchell Elementary
Riggin	Everett	CGW	1.13	Neighborway	3	Quick Build NW	$8,092.24	SRTS Plan, Northview Elementary & Mitchell Elementary
Vine	Charles	CGW	0.48	Neighborway	4	Resurface	$0.00	East Washington Academy
15th	Walnut	Hackley	0.48	Neighborway	4	Resurface	$0.00	Southview Elementary
Sheffield	Riggin	CGW	0.14	Neighborway	5	Resurface	$0.00	
Cowing	Wheeling	Pauline	0.24	Neighborway	5	Quick Build NW	$1,679.83	
Port	Hoyt	Memorial	0.42	Neighborway	5	Resurface	$0.00	
Port	Memorial	5th	0.43	Neighborway	5	Resurface	$0.00	
Rosewood	Purdue	Riggin	0.50	Neighborway	5	Quick Build NW	$3,574.44	
Petty	Benton	Petty	1.13	Lane	2	Resurface	$0.00	SRTS Plan, Storer Elementary
Walnut St	Memorial	Ball G.W.	0.50	Lane	3	Quick Build Stripe	$15,958.81	SRTS Plan, Southview Elementary
Walnut St	Ball G.W.	26th	0.51	Lane	3	Quick Build Stripe	$16,200.36	SRTS Plan, Southview Elementary
Cowing	Oakwood	Wheeling	0.53	Lane	3	Quick Build Stripe	$16,985.42	SRTS Plan, Northside Middle
Yale	Wheeling	NVE	0.58	Lane	3	Quick Build NW	$18,411.97	SRTS Plan, Northview Elementary
Bethel	New York	Wheeling	0.19	Lane	4	Resurface	$0.00	
Rosewood	Yale	Purdue	0.12	Lane	5	Quick Build NW	$3,754.15	
Janney	Wheeling	Berkeley	0.14	Lane	5	Resurface	$0.00	
Minnetrista Prkwy	Wheeling	Centennial	0.49	Lane	5	Resurface	$0.00	
Centennial	New York	Walnut	0.80	Lane	5	Resurface	$0.00	
Bethel	Tillotson	New York	1.11	MU Trail	3	Resurface & BSU BMP	$0.00	BSU, SRTS Plan, N.side Middle

Wheeling	McGalliard	Riggin	1.10	MU Trail	3	Wheeling, Resurf	$286,043.70	Wheeling Project
Bethel	Timber	Tillotson	0.63	MU Trail	4	Resurf &Mor.TIF	$0	Morrison TIF Team, N.side Mid
Wheeling	WRGW	Centennial	0.54	MU Trail	4	Wheeling, Resurf	$140,253.10	Wheeling Project
Wheeling	Centennial	McGalliard	0.75	MU Trail	4	Wheeling, Resurf	$196,645.99	Wheeling Project

2021 Totals

By Facility Type	Miles	Cost
Protected Lanes	0.76	$65,749.35
Neighborways	6.16	$22,335.65
Lanes	4.98	$71,310.72
MU Trail	4.13	$622,942.79
Total	**16.04**	**$782,338.51**

By Implementation Method	Miles	Cost
Resurface	5.79	$0.00
Quick Build NW	3.82	$44,501.77
Quick Build Pilot	0.76	$65,749.35
Quick Build Stripe	1.54	$49,144.59
BSU BMP	1.11	$0.00
Morrison TIF	0.63	$0.00
Wheeling Project	2.39	$622,942.79
Total	**16.04**	**$782,338.51**

Implementation Plan Post 2021 Projects

Protected Bike Lanes - 9.95 mi

Street Name	Project Extents		Length (mi)	Tier	Coordination
Jackson	Tillotson	White River	1.02	1	Westview Elementary, St Mary's, Burris IND
Dr MLK Jr	Centennial	McGalliard	0.76	2	
Madison	28th	18th	0.59	2	Southview, Grisson, & Southside
Tillotson	White River	Jackson	0.50	2	Westview, St Mary's
Jackson	Westview	Tillotson	0.32	2	Westview Elementary, St Mary's
Madison	18th	Memorial	0.41	3	
28th	Walnut	Meeker	1.50	3	Grissom Elementary & Southside Middle
Macedonia	29th	Memorial	1.06	3	Grissom Elementary & Southside Middle
Walnut	Centennial	McGalliard	0.70	3	Northview Elementary
Jackson	Hackley	Bunch	0.79	3	INDOT, East Washington Academy
Jackson	White River	Hackley	1.20	4	INDOT
Jackson	Bunch	Mangrove	1.10	4	INDOT

Neighborways - 4.38 mi

Street Name	Project Extents		Length (mi)	Tier	Coordination
Woodway	Stradling	Noel	0.46	3	Westview Elementary
Stradling	Godman	Burton	0.37	3	Westview Elementary
Powers	Kilgore	Liberty	0.56	4	
Norwood	Vienna Woods	Oakwood	0.30	4	Mitchell Elementary
Viennawoods	Woodmont	Norwood	0.17	4	Mitchell Elementary
Woodmont	Vien-nawoods	Rosewood	0.52	4	Mitchell Elementary
Meeker	Fuson	29th	0.44	5	
Tillotson	31st	26th	0.30	5	
28th	Post	Hoyt	0.60	5	
31st	Post	Park	0.38	5	
Umbarger	White River	Godman	0.28	5	

Bike Lanes - 13.05 mi

Street Name	Project Extents		Length (mi)	Tier	Coordination
Hoyt	Port	Memorial	0.55	2	Southview Elementary
Walnut	Madison	28th	0.59	3	
26th	Tillotson	Hoyt	0.37	3	
Liberty	Hoyt	Gilbert	0.58	3	
Tillotson Over-pass	Memorial	Tillotson	0.71	3	
Tillotson	Kilgore	White River	0.21	3	
8th St	Port	Elliott	0.47	3	Southview Elementary
Burlington	Memorial	Ohio	1.34	3	East Washington Academy & Sutton
16th	Meeker	Eaton	0.50	3	St Lawrence & Inspire Academy
Meeker	29th	16th	1.00	3	Grissom, Southside, St Lawrence, Inspire
Perkins	Memorial	Kilgore	0.58	3	Southview Elementary
Cromer	Wheeling	Walnut	0.60	3	Northview E & Northside M
Oakwood	McGalliard	Purdue	0.45	3	Mitchell Elementary
Mansfield	Brentwood	Storer Link	0.14	3	Storer Elementary
Euclid	Storer Link	Tillotson	0.18	3	Storer Elementary
Madison	Walnut	28th	0.59	4	
Elliott	Willard	Charles	0.29	4	
Hoyt	26th	Port	0.86	4	
Hoyt	Memorial	Liberty	0.76	4	
Kilgore	Tillotson	Batavia	0.42	4	INDOT
Batavia	Memorial	White River	0.56	5	
Godman	Stradling	White River	1.30	5	

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Implementation Plan Post 2021 Projects

Greenways - 19.21 mi

Street Name	Project Extents		Length (mi)	Tier	Coordination
McGalliard W	Walnut	Dr MLK Jr	0.74	1	INDOT, SRTS Plan, N.View E, L.Fellow
McGalliard E	Walnut	Dr MLK Jr	0.74	1	INDOT, SRTS Plan, N.View E, L.Fellow
Tillotson	Jackson	Bethel	1.50	2	Nside, Storer, Wview, St Mary's, Burris
McGalliard W	Wheeling	Walnut	0.84	2	INDOT, SRTS Plan, Northview E
McGalliard E	Wheeling	Walnut	0.83	2	INDOT, SRTS Plan, N.View E, N.side M
Sky Park Link	CGW	Harvard	0.02	2	SRTS Plan, Northview Elementary
Scheidler GW	Bethel	Purdue	0.85	2	Northside Middle & Mitchell Elementary
McGalliard W	Dr MLK Jr	Meadowview	0.91	3	INDOT
McGalliard E	Dr MLK Jr	Elgin	0.58	3	INDOT
Batavia Link	Ball GW	Batavia	0.03	3	
NVE CGW Link	NVE	CGW	0.05	3	Northview Elementary
Storer Link	Cardinal Creek GW	Mansfield	0.15	3	Storer Elementary
Maring Hunt Link	Ball GW	13th	0.52	3	SRTS Plan, Southview Elementary
McGalliard E	Tillotson	Wheeling	0.92	3	INDOT, Northside Middle
Tillotson	26th	Memorial	1.00	4	
Kilgore	Batavia	Adams	1.01	4	INDOT
Mini Gap	Yorktown Trail	WRGW	0.16	4	
Morrison	River	Jackson	0.89	4	
Mcgalliard W	Morrison	Tillotson	1.19	4	INDOT
McGalliard W	Tillotson	Wheeling	0.91	4	INDOT
McGalliard E	Clara	Tillotson	0.62	4	INDOT
Sky Park Mall Link	Harvard	Mall	0.01	4	
Barr	McGalliard	Dr MLK Jr	0.77	4	
Scheidler GW Link	Scheidler GW	Norwood	0.18	4	Mitchell Elementary
Elliott Link	Ball GW	18th	0.08	4	Southview Elementary
Madison Ramp	Madison	CGW	0.03	5	
Petty Trailhead	Cardinal Creek	Petty	0.25	5	
Ball Greenway	Tillotson	Gharkey	1.96	5	
Ball Greenway	Gharkey	Macedonia	1.39	5	
Hoyt Link	Ball GW	Hoyt	0.08	5	

County Routes - 239. 30 mi

Street Name	Project Extents		Length (mi)	Tier	Coordination
Burlington	Memorial	500 S	5.37	5	
Walnut	300 S	Madison	0.46	5	
8th	Perdieu	Clark	0.92	5	
Cornbread	Proctor	Cowan	1.98	5	
Eaton Routes	Wheeling	Albany	65.75	5	
Selma Routes	Selma	Albany	30.95	5	
Reservoir Routes	700s	Southside	58.61	5	
Daleville Routes	Daleville	Yorktown	26.29	5	
Cammack Routes	Yorktown	Gaston	40.36	5	
Cammack Routes 2	Yorktown	Gaston	1.99	5	
Jackson	600 W	Morrison	3.14	5	
500 W	River	Jackson	1.71	5	
Memorial	Butterfield	Country Club	0.63	5	
Kilgore Perdieu	Cornbread	Proctor	1.14	5	

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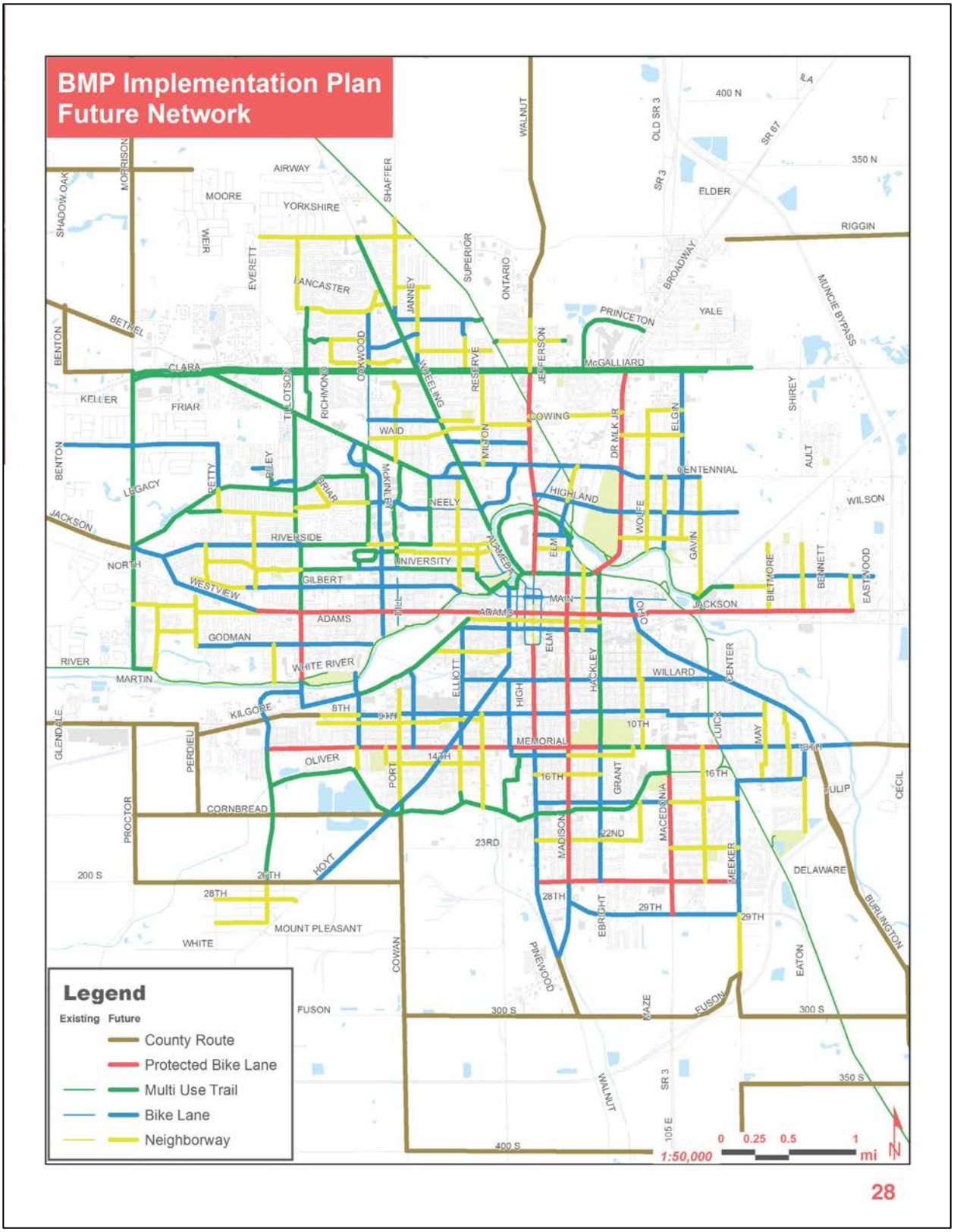
PROJECT MAPS


BMP Implementation Plan
Future Network
Legend
Existing Future
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Protected Bike Lane
Multi Use Trail
Bike Lane
Neighborway
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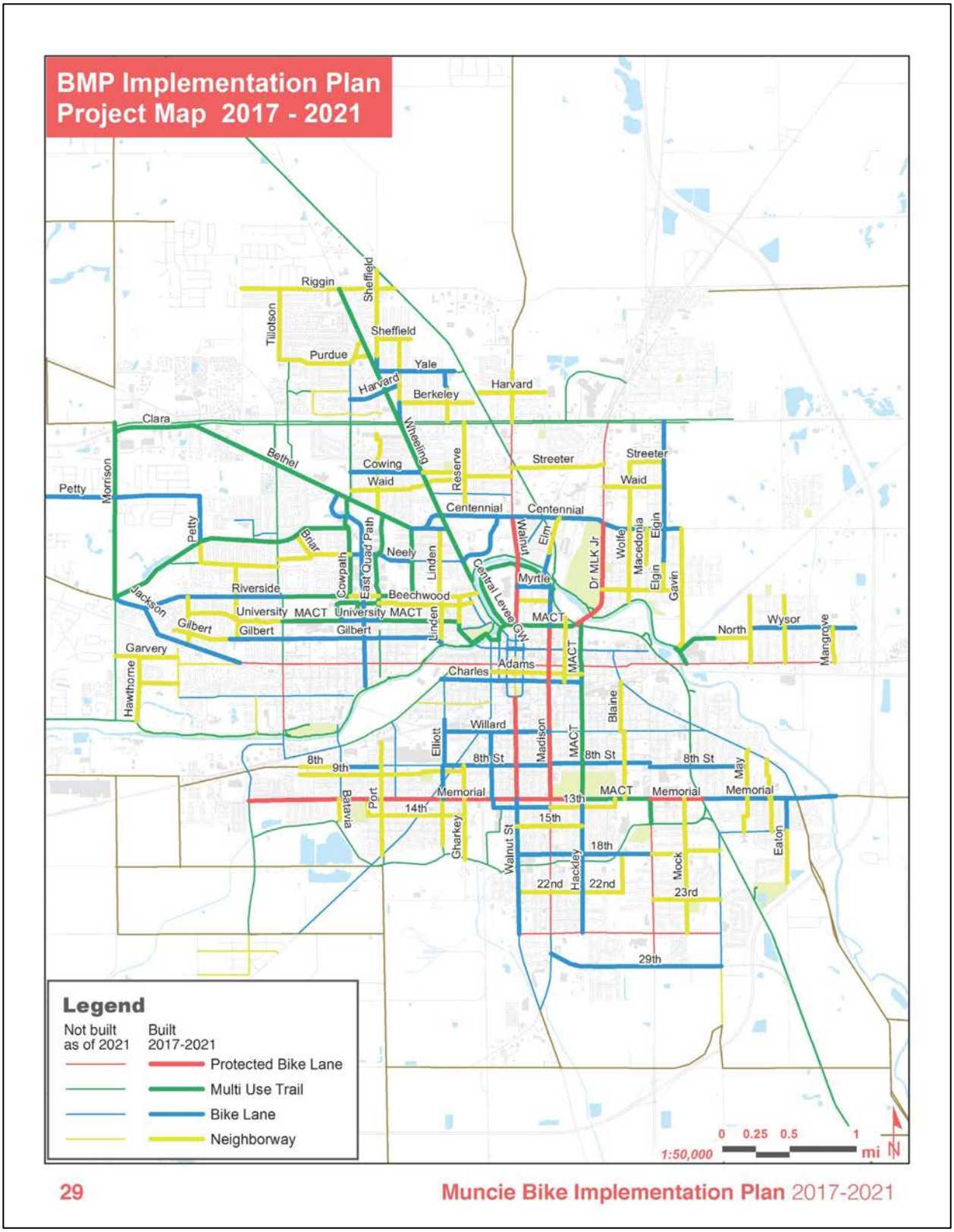
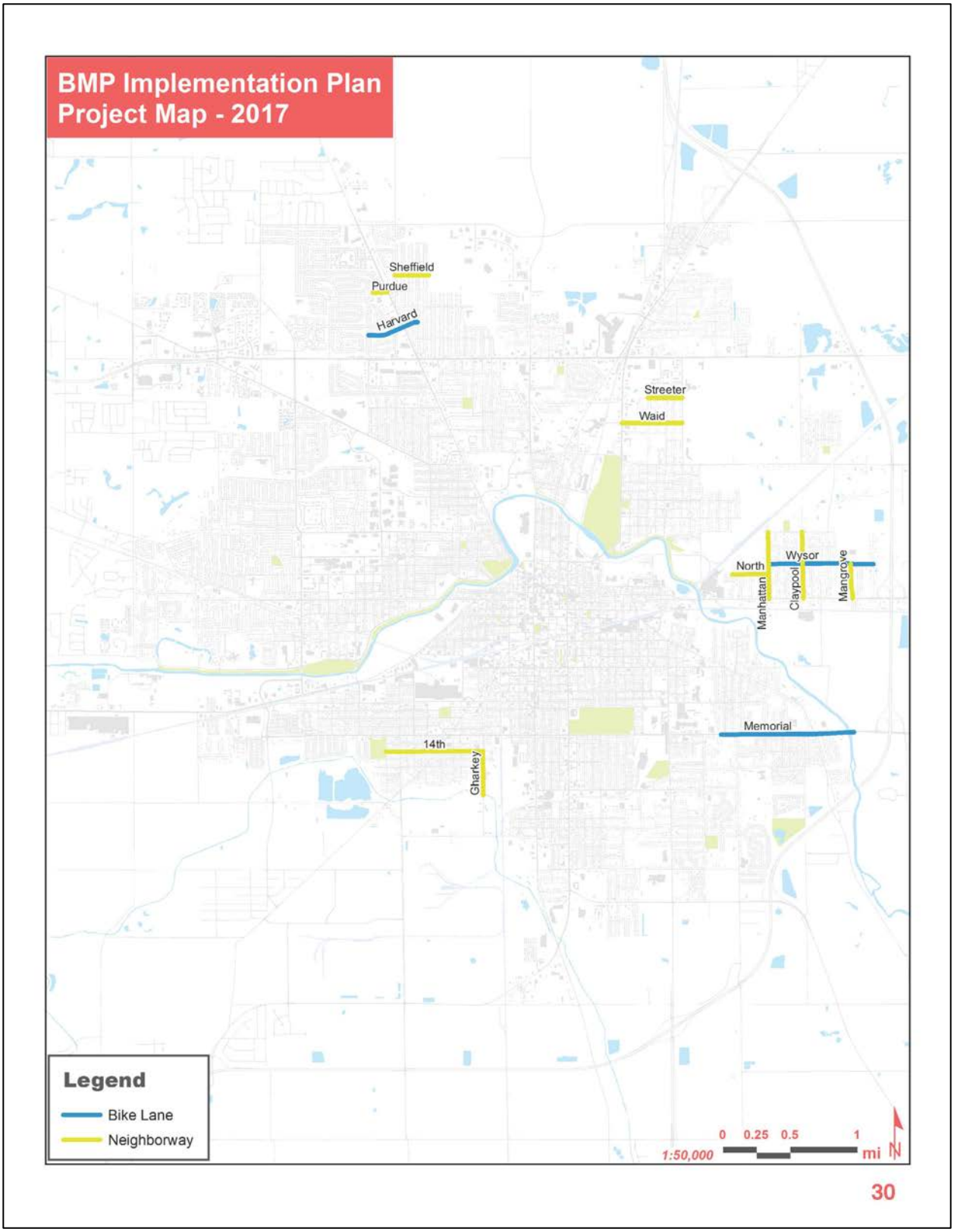
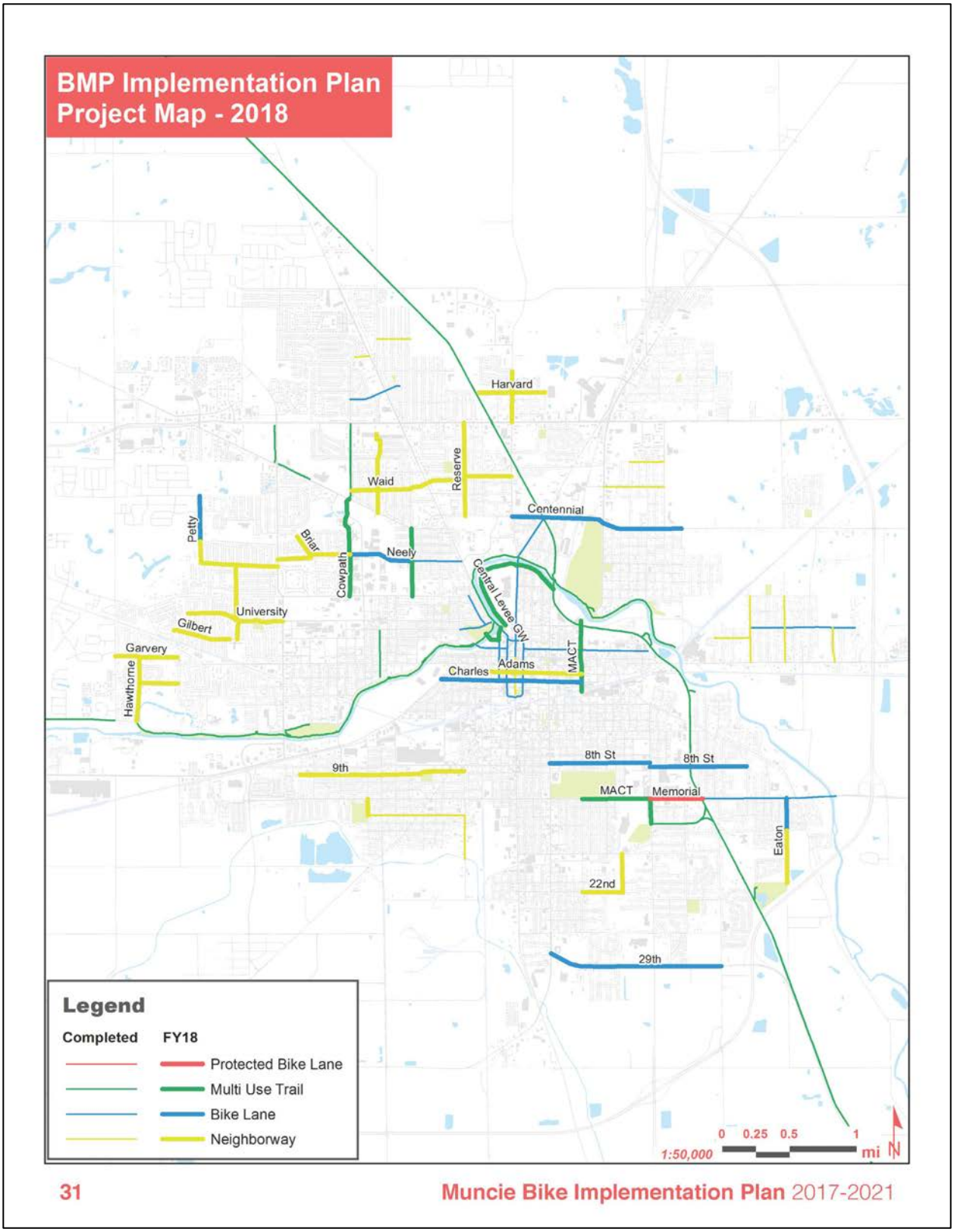
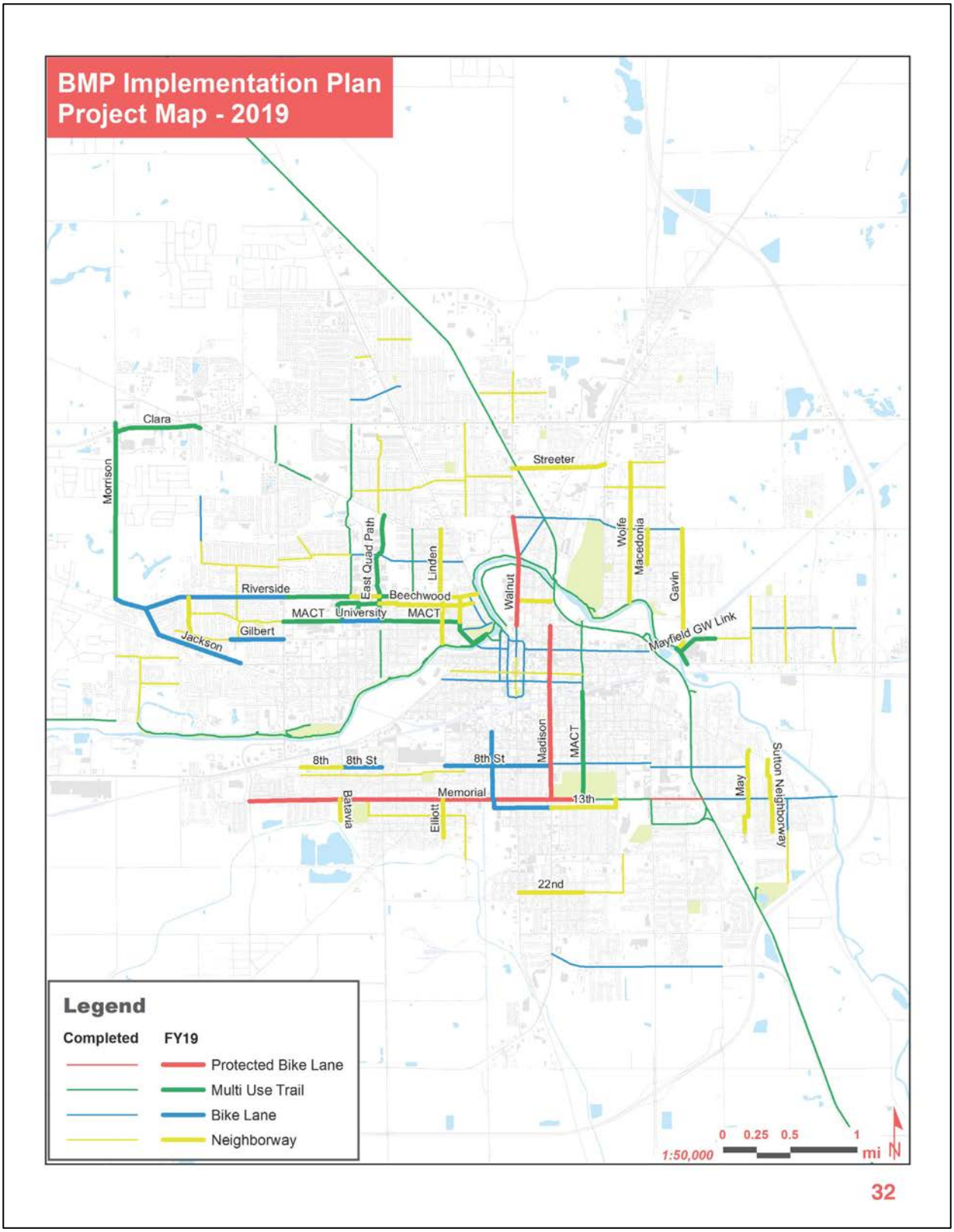
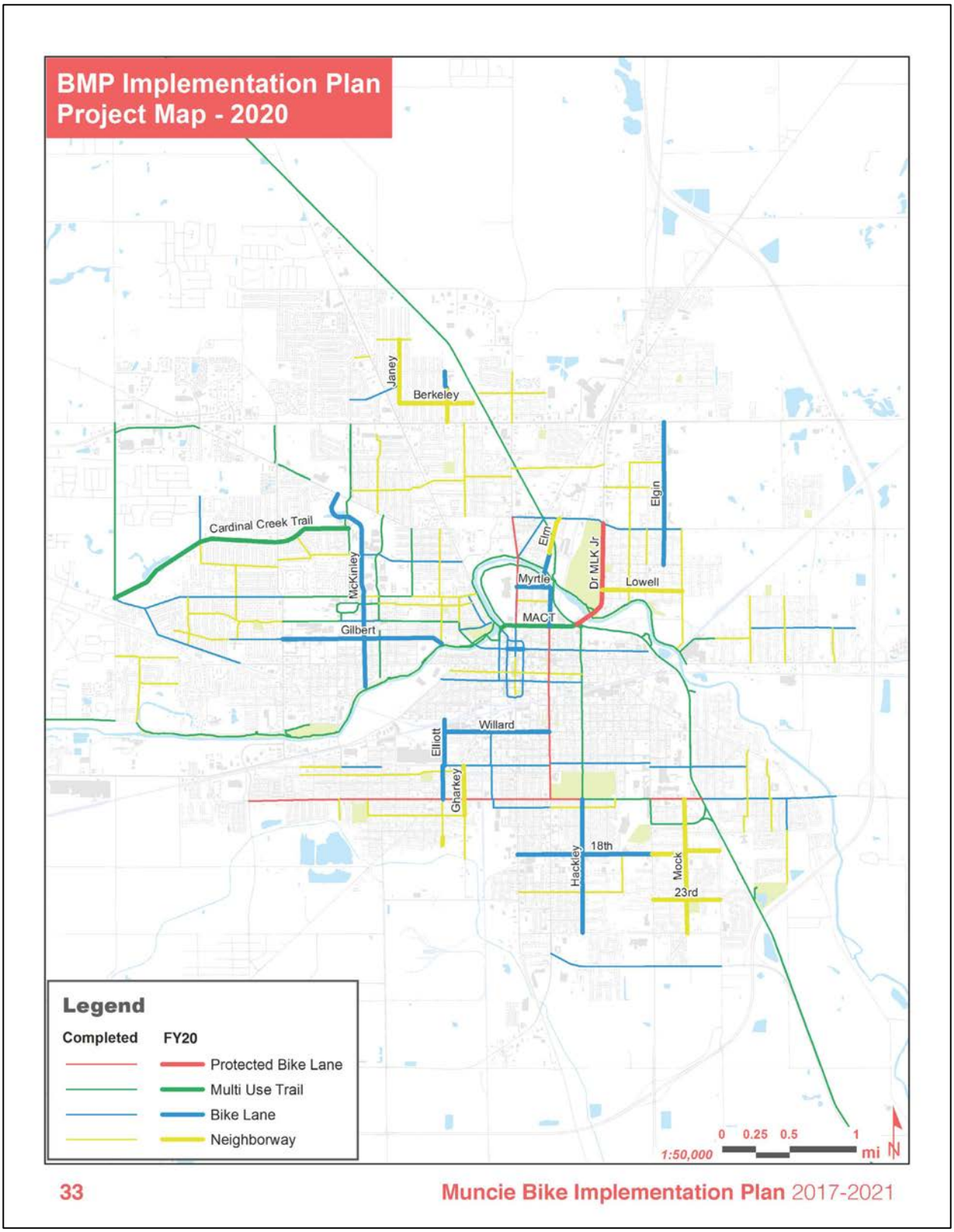
28

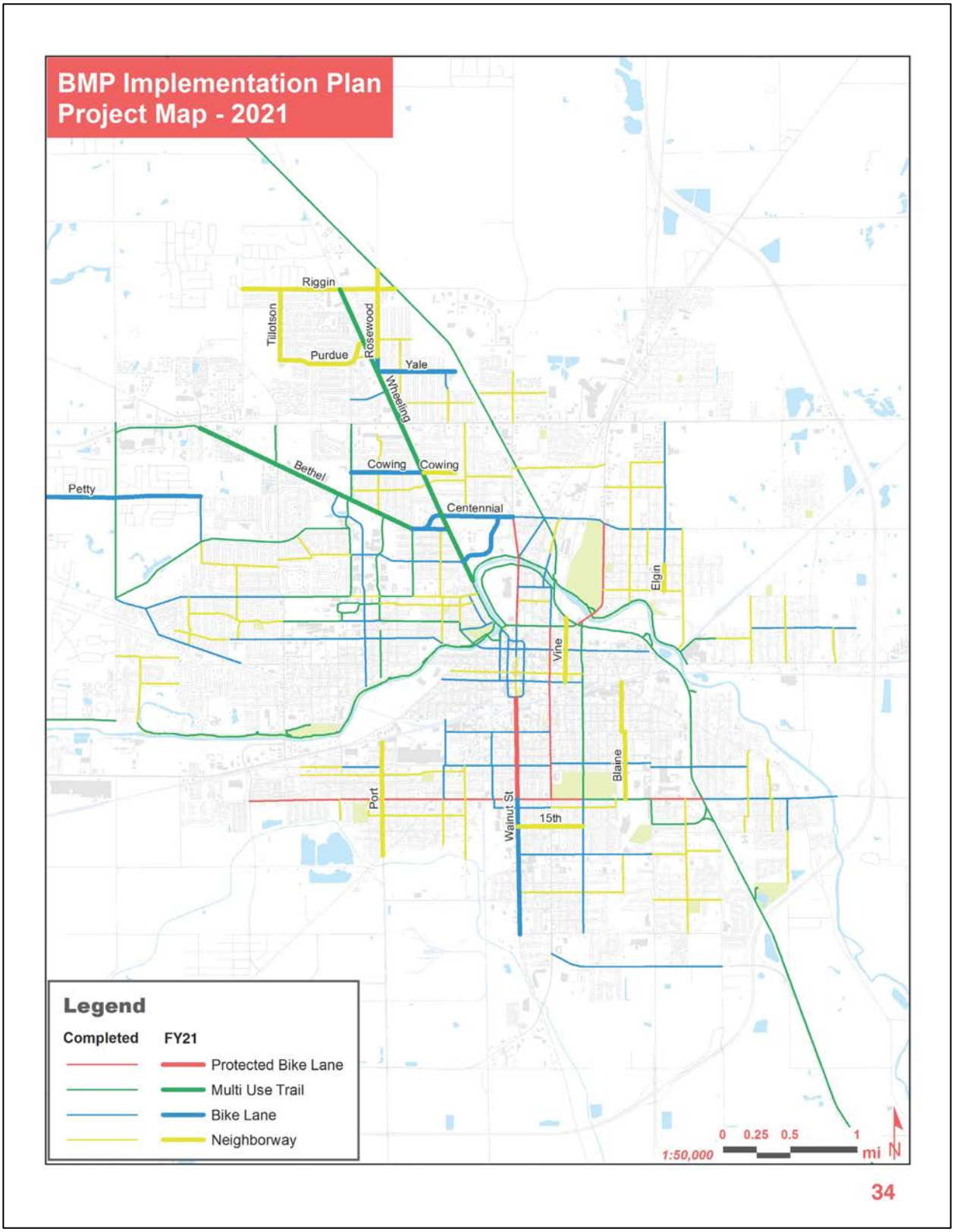

BMP Implementation Plan
Project Map 2017 - 2021
Riggin
Sheffield
Tillotson
Sheffield
Purdue
Yale
Harvard
Harvard
Berkeley
Clara
Wheeling
Bethel
Cowing
Waid
Reserve
Streeter
Streeter
Waid
Petty
Morrison
Centennial
Centennial
Petty
Briar
Neely
Linden
Walnut
Elm
Dr MLK Jr
Wolfe
Macedonia
Elgin
Elgin
Gavin
Cowpath
East Quad Path
Central Levee
Myrtle
Riverside
Beechwood
Jackson
University
MACT
University
MACT
Gilbert
Gilbert
Gilbert
Linden
GW
MACT
North
Wysor
Mangrove
Garvery
Adams
MACT
Charles
Hawthorne
Blaine
Willard
Elliott
Madison
MACT
8th
9th
8th St
8th St
8th St
May
Memorial
MACT
Memorial
Memorial
Port
Wabash
14th
13th
15th
Gharkey
Walnut St
18th
Hackley
22nd
22nd
Mock
23rd
Eaton
29th
Legend
Not built as of 2021
Built 2017-2021
Protected Bike Lane
Multi Use Trail
Bike Lane
Neighborway
0 0.25 0.5 1
mi
1:50,000
N
29
Muncie Bike Implementation Plan 2017-2021

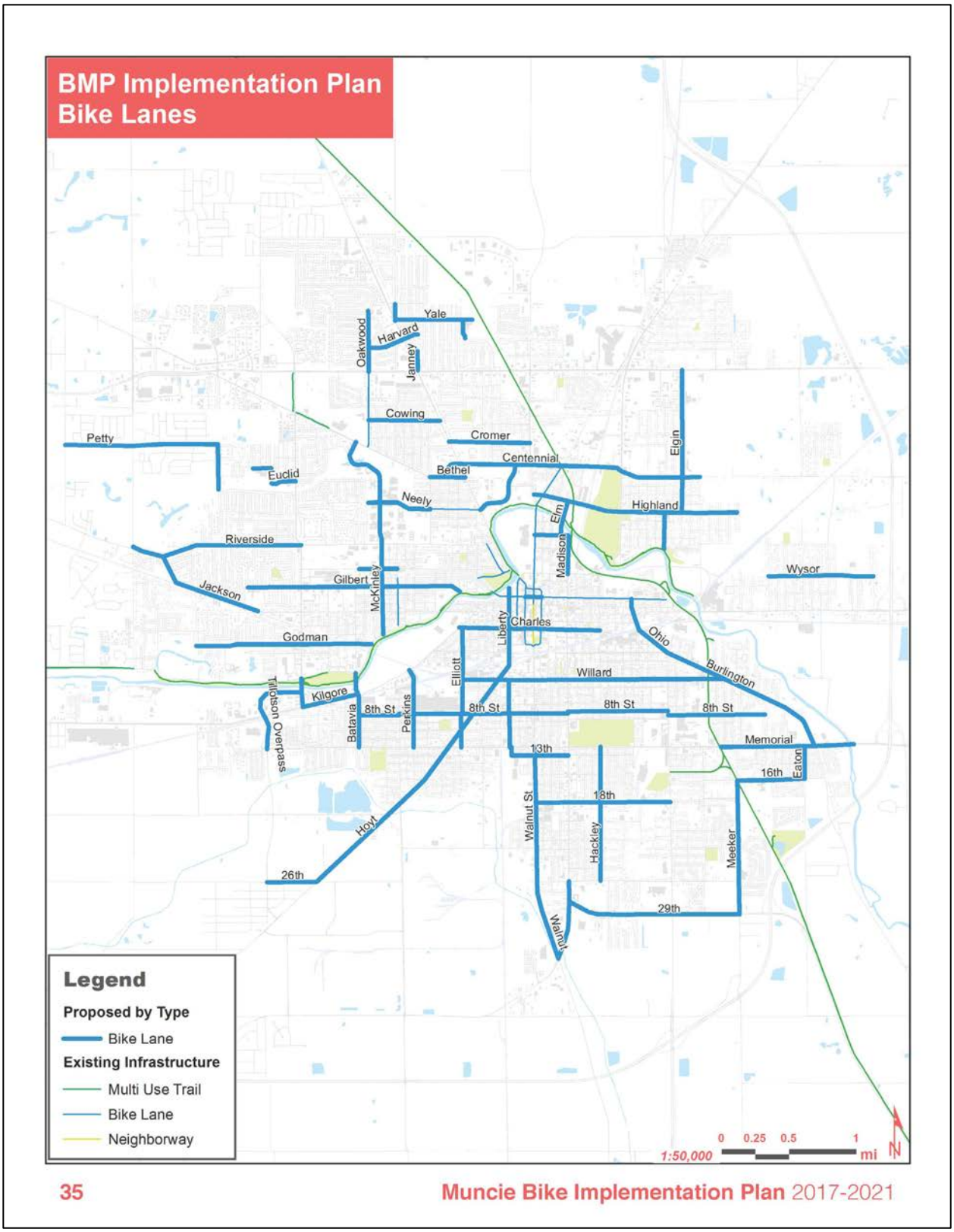

BMP Implementation Plan
Project Map - 2017
Sheffield
Purdue
Harvard
Streeter
Waid
North
Wysor
Manhattan
Claypool
Mangrove
Memorial
14th
Gharkey
Legend
Bike Lane
Neighborway
0 0.25 0.5 1
mi
1:50,000
N
30

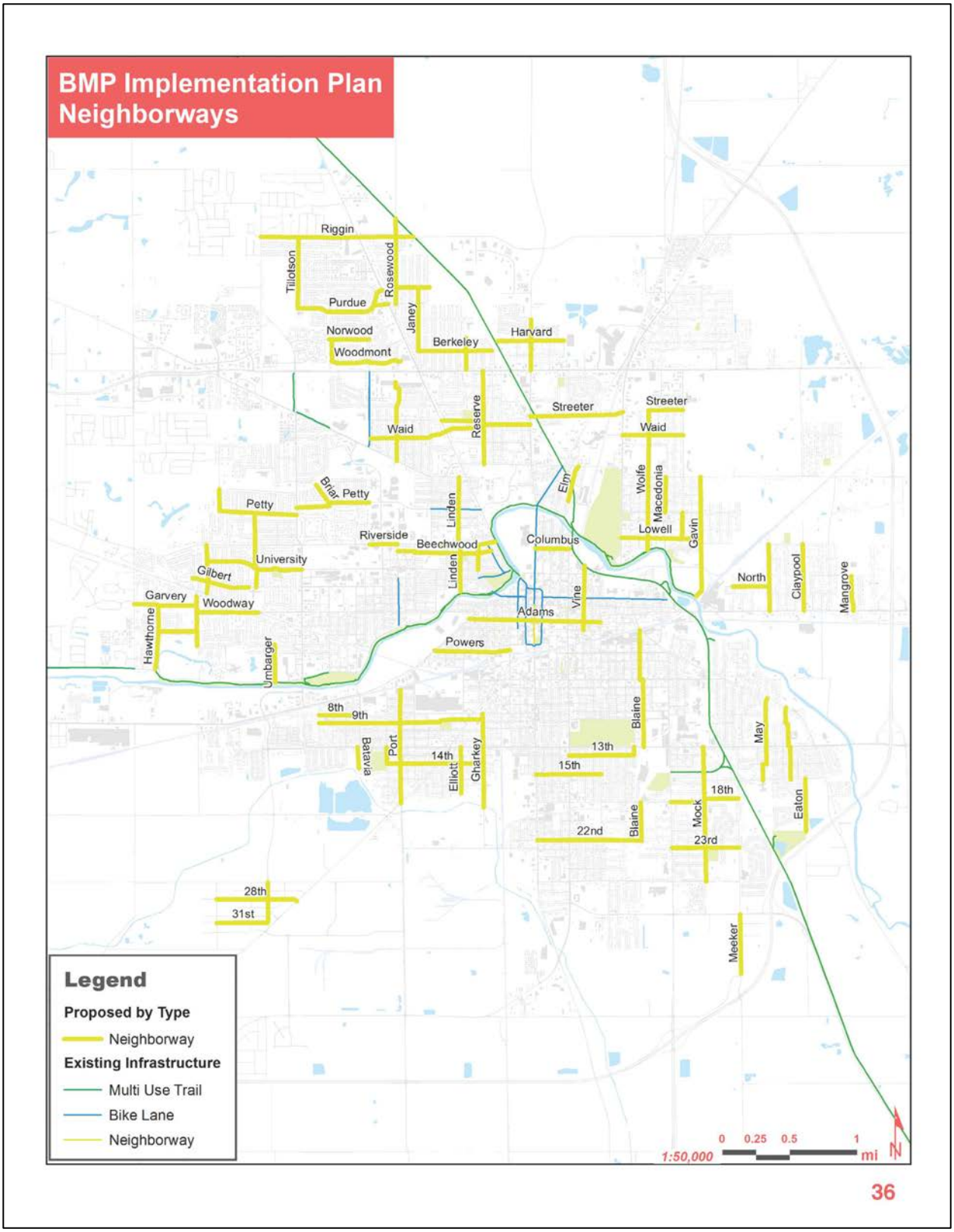

BMP Implementation Plan
Project Map - 2018
Harvard
Waid
Reserve
Centennial
Petty
Briar
Cowpath
Neely
Central Levee GW
University
Gilbert
Garvery
Hawthorne
Adams
Charles
MACT
8th St
8th St
9th
MACT
Memorial
Eaton
22nd
29th
Legend
Completed
FY18
Protected Bike Lane
Multi Use Trail
Bike Lane
Neighborway
0 0.25 0.5 1
1:50,000
mi
N

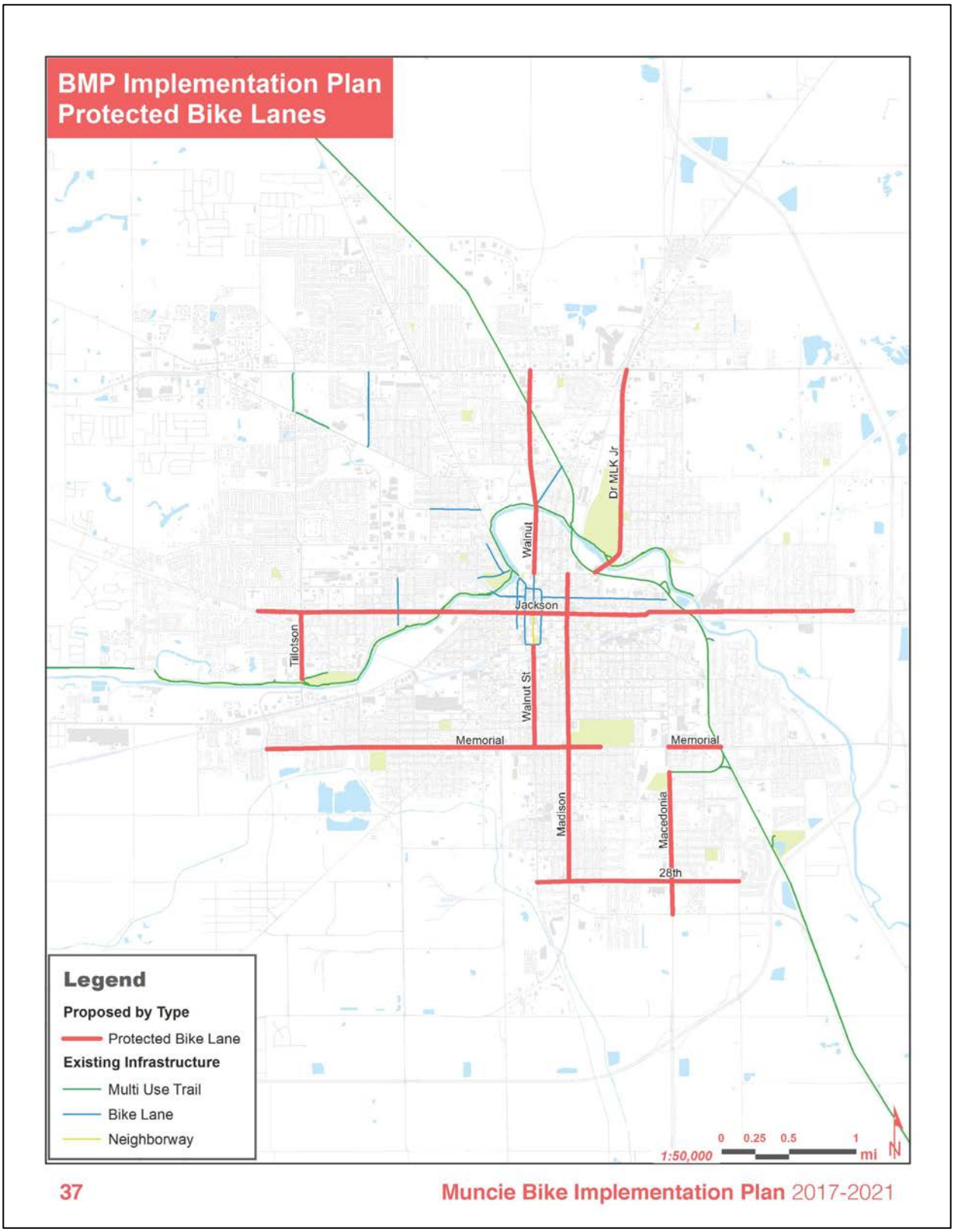

BMP Implementation Plan
Project Map - 2019
Clara
Morrison
Streeter
Wolfe
Macedonia
Gavin
East Quad Path
Linden
Walnut
Riverside
Beechwood
MACT
University
MACT
Gilbert
Jackson
Mayfield GW Link
8th
8th St
8th St
Madison
MACT
Memorial
13th
Batavia
Elliott
May
Sutton Neighborway
22nd
Legend
Completed
FY19
Protected Bike Lane
Multi Use Trail
Bike Lane
Neighborway
0 0.25 0.5 1
1:50,000
mi
N
32

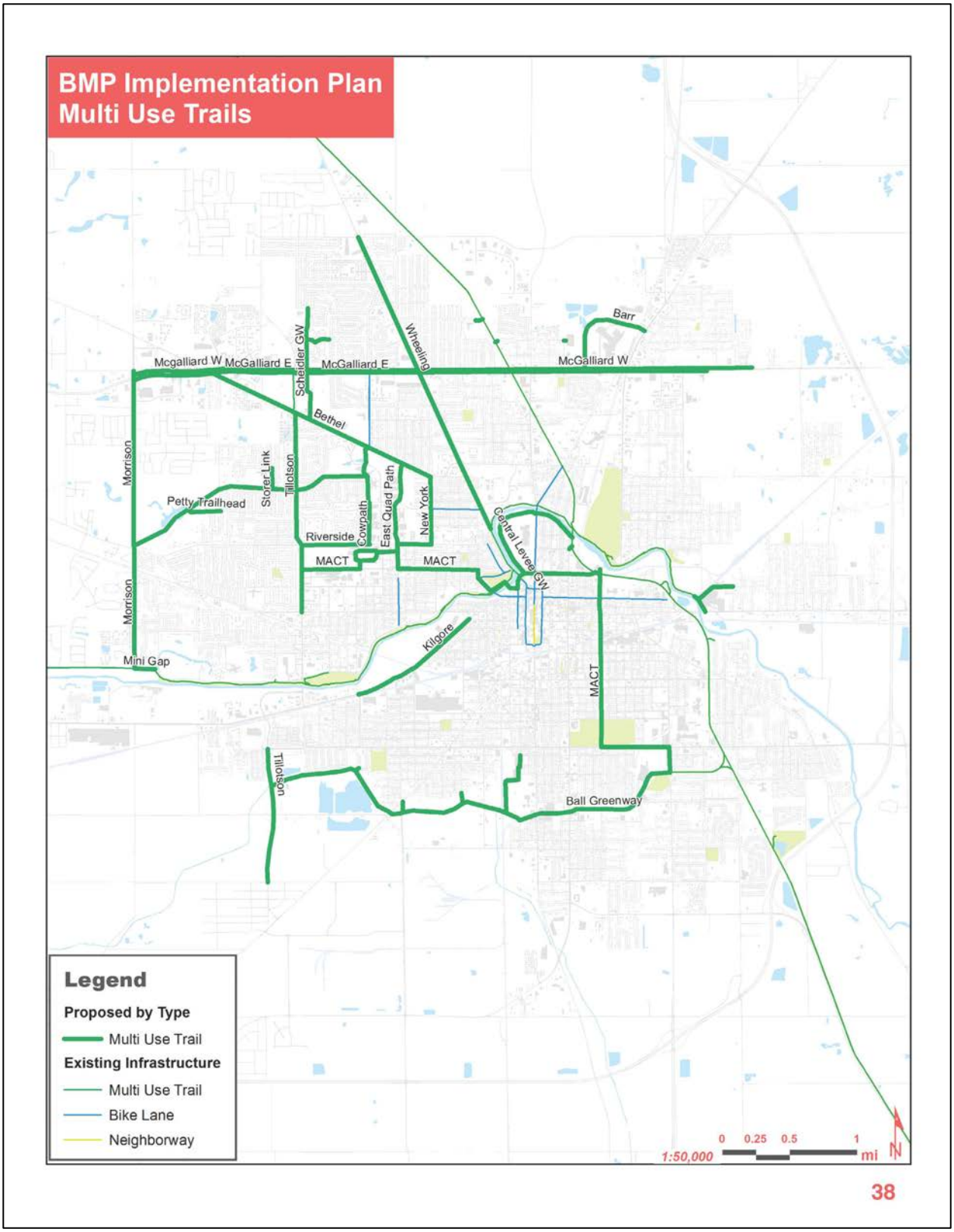

BMP Implementation Plan
Project Map - 2020
Janey
Berkeley
Cardinal Creek Trail
McKinley
Gilbert
Elm
Myrtle
Dr MLK Jr
Elgin
Lowell
MACT
Willard
Elliott
Gharkey
Hackley
18th
Mock
23rd
Legend
Completed
FY20
Protected Bike Lane
Multi Use Trail
Bike Lane
Neighborway
0 0.25 0.5 1
mi
1:50,000
N
33
Muncie Bike Implementation Plan 2017-2021

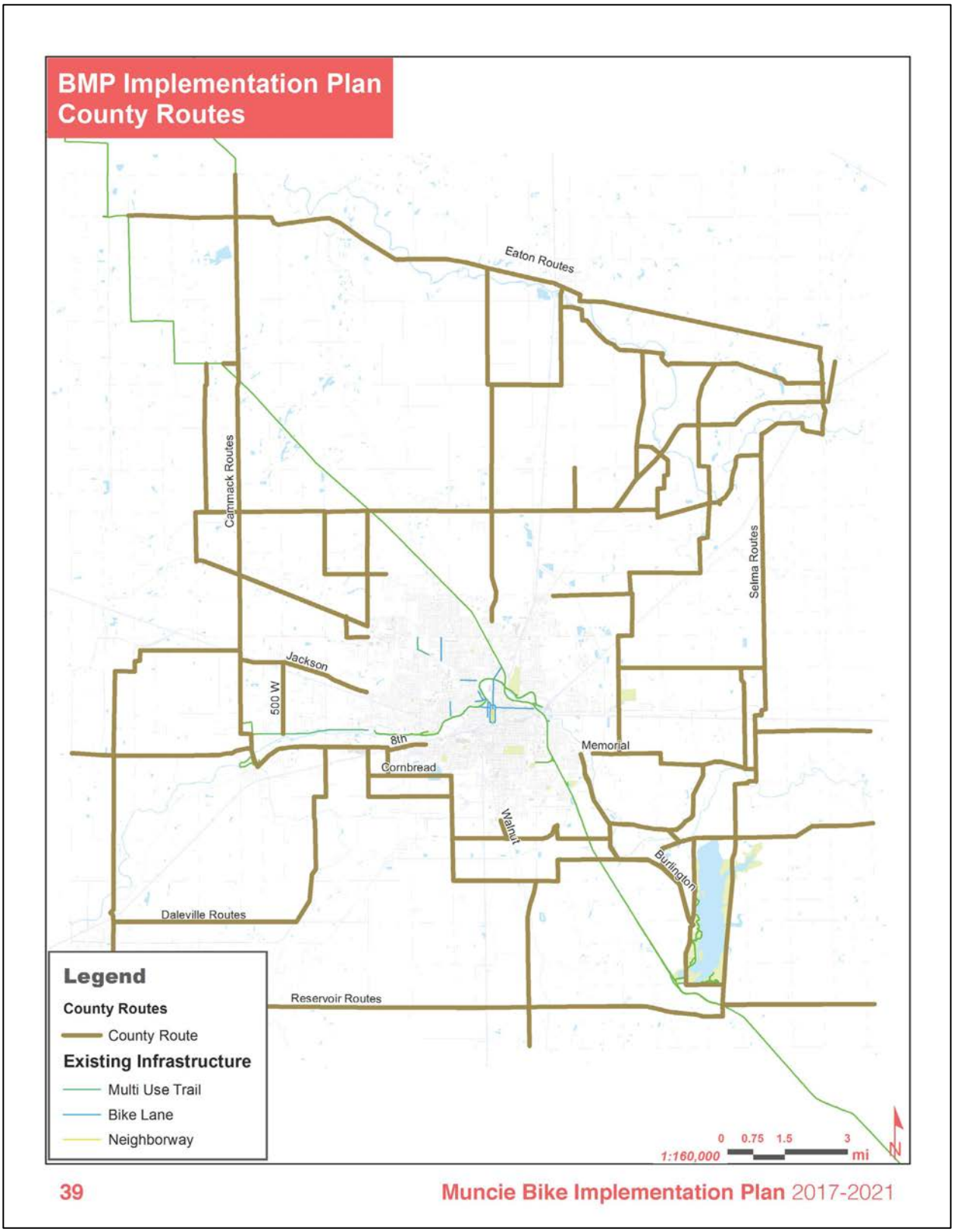

BMP Implementation Plan
Project Map - 2021
Riggin
Tillotson
Purdue
Rosewood
Yale
Wheeling
Bethel
Cowing
Cowing
Petty
Centennial
Elgin
Vine
Blaine
Port
Walnut St
15th
Legend
Completed
FY21
Protected Bike Lane
Multi Use Trail
Bike Lane
Neighborway
0 0.25 0.5 1
1:50,000
mi
N
34

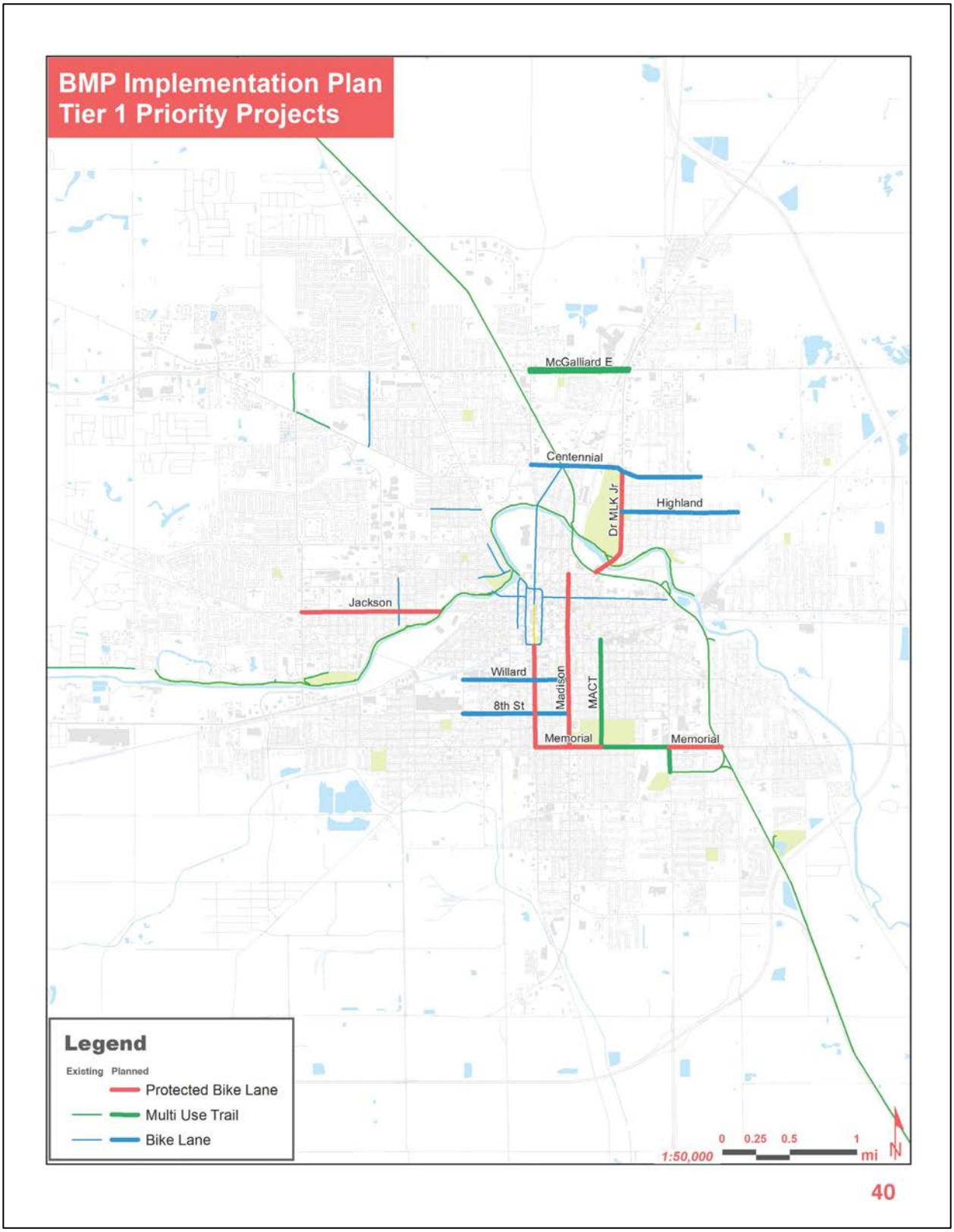

BMP Implementation Plan
Bike Lanes
Yale
Harvard
Oakwood
Janney
Cowing
Petty
Cromer
Centennial
Elgin
Euclid
Bethel
Neely
Highland
Elm
Madison
Riverside
Wysor
Jackson
Gilbert
McKinley
Liberty
Charles
Ohio
Godman
Willard
Burlington
Elliott
Kilgore
Tillotson Overpass
Batavia
8th St
Perkins
8th St
8th St
8th St
Memorial
13th
16th
Eaton
18th
Walnut St
Hackley
Meeker
Hoyt
26th
29th
Walnut
Legend
Proposed by Type
Bike Lane
Existing Infrastructure
Multi Use Trail
Bike Lane
Neighborway
0 0.25 0.5 1
1:50,000
mi
N

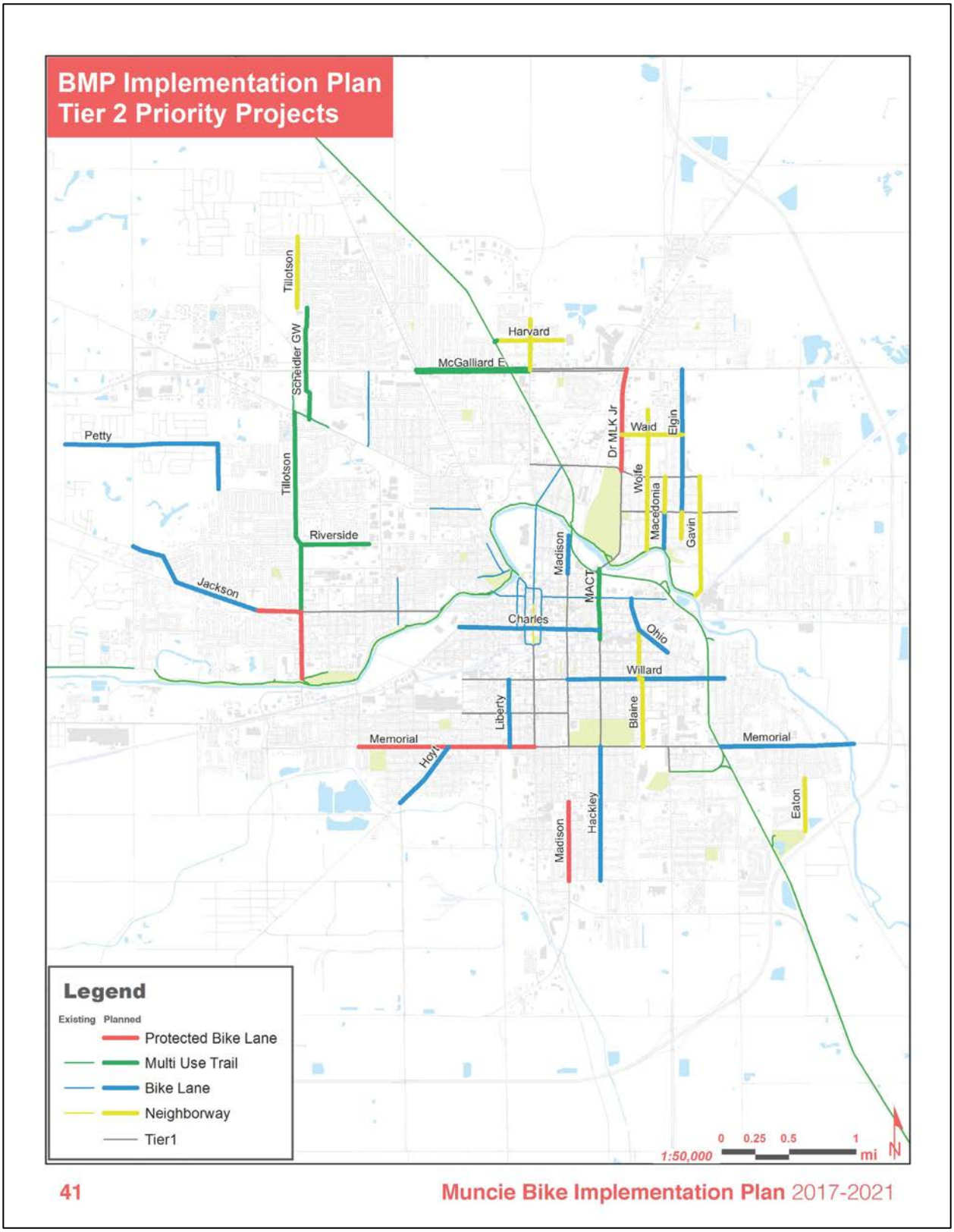

BMP Implementation Plan
Neighborways
Riggin
Tillotson
Rosewood
Purdue
Janey
Norwood
Woodmont
Berkeley
Harvard
Waid
Reserve
Streeter
Streeter
Waid
Wolfe
Macedonia
Elm
Briar
Petty
Petty
Linden
Riverside
Beechwood
Columbus
Lowell
Gavin
University
Gilbert
Linden
Garvery
Woodway
Vine
Adams
North
Claypool
Mangrove
Hawthorne
Umbarger
Powers
8th
9th
Batavia
Port
14th
Elliott
Gharkey
Blaine
13th
15th
May
18th
Mock
Eaton
22nd
Blaine
23rd
28th
31st
Meeker
Legend
Proposed by Type
Neighborway
Existing Infrastructure
Multi Use Trail
Bike Lane
Neighborway
0 0.25 0.5 1
mi
1:50,000
N
36

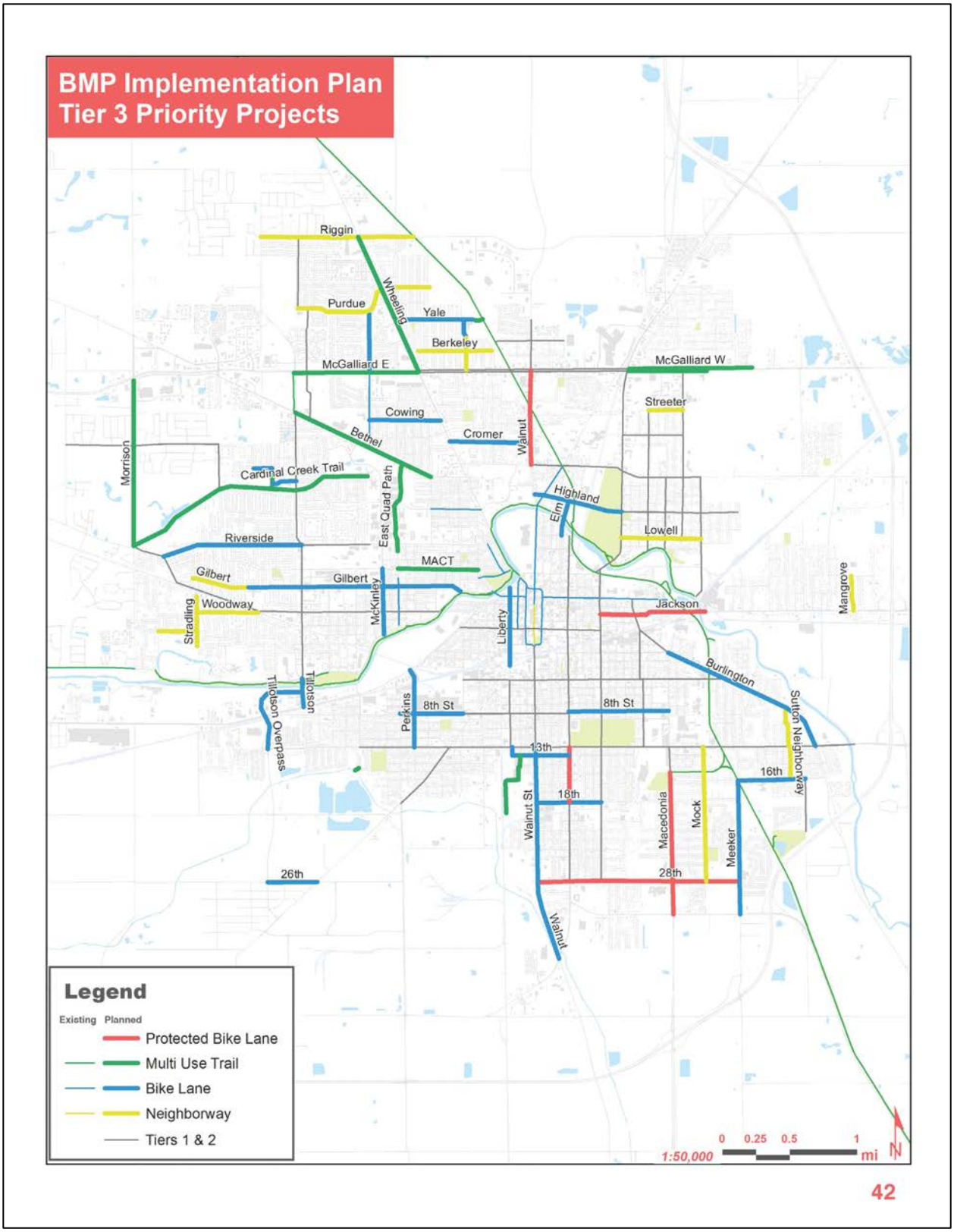

BMP Implementation Plan
Protected Bike Lanes
Dr MLK Jr
Walnut
Jackson
Tillotson
Walnut St
Memorial
Memorial
Madison
Macedonia
28th
Legend
Proposed by Type
Protected Bike Lane
Existing Infrastructure
Multi Use Trail
Bike Lane
Neighborway
1:50,000
0 0.25 0.5 1 mi
N
37
Muncie Bike Implementation Plan 2017-2021

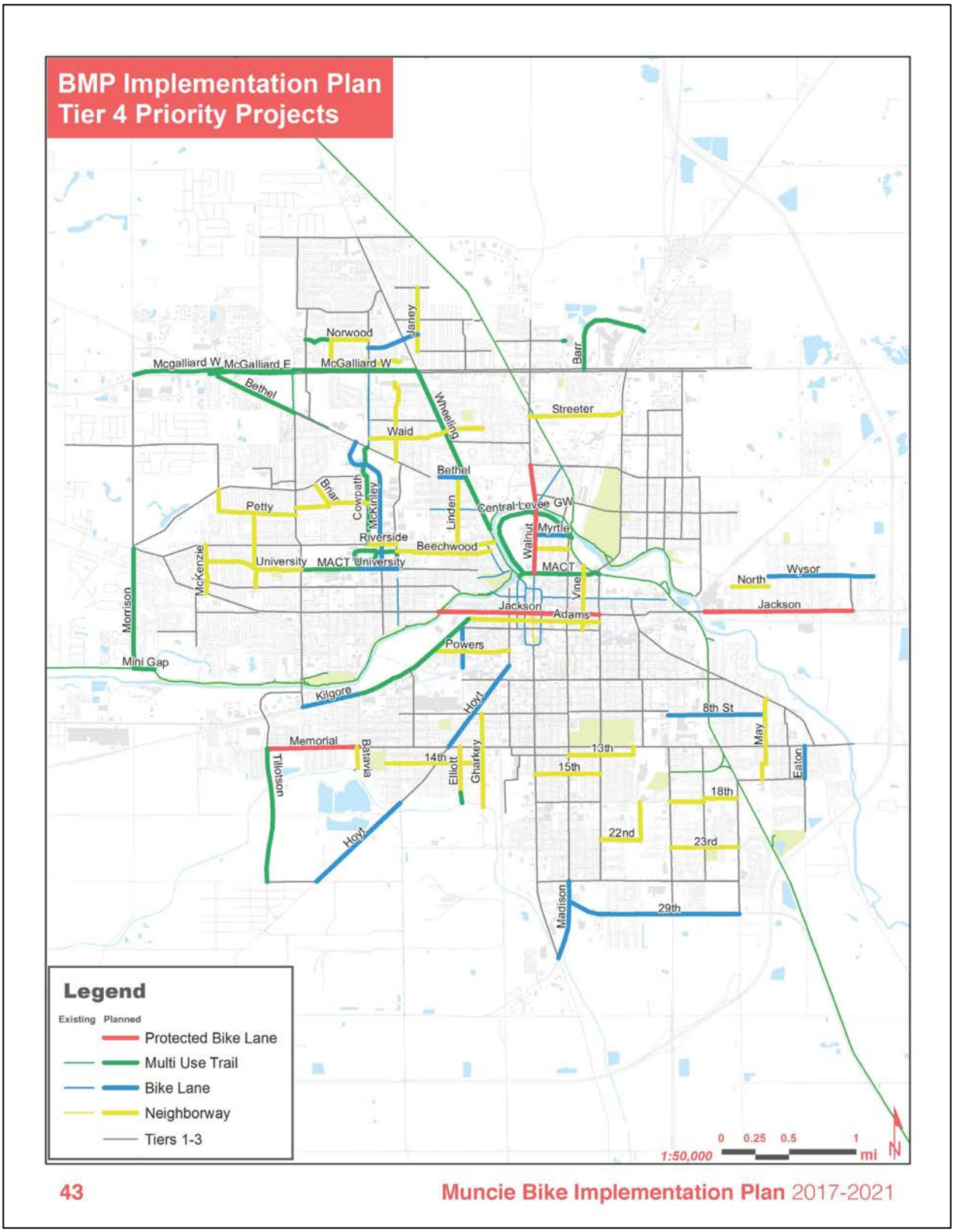

BMP Implementation Plan
Multi Use Trails
Mcgalliard W
McGalliard E
McGalliard E
McGalliard W
Barr
Wheeling
Scheidler GW
Bethel
Morrison
Petty Trailhead
Storer Link
Tillotson
Cowpath
East Quad Path
New York
Riverside
MACT
MACT
Central Levee GW
Morrison
Mini Gap
Kilgore
MACT
Tillotson
Ball Greenway
Legend
Proposed by Type
Multi Use Trail
Existing Infrastructure
Multi Use Trail
Bike Lane
Neighborway
1:50,000
0 0.25 0.5 1
mi
N
38

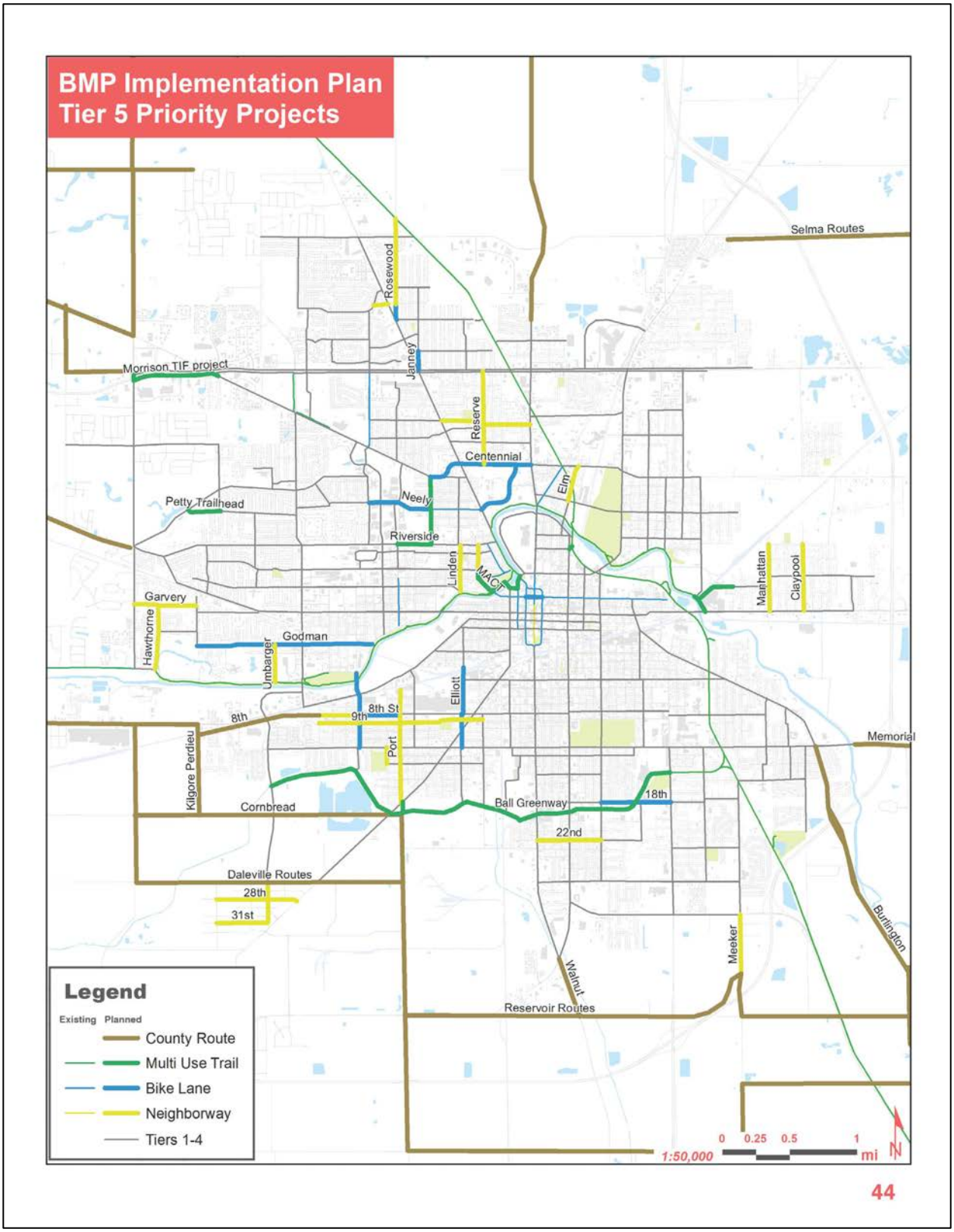

BMP Implementation Plan
County Routes
Eaton Routes
Cammack Routes
Selma Routes
Jackson
500 W
8th
Cornbread
Memorial
Walnut
Burlington
Daleville Routes
Reservoir Routes
Legend
County Routes
County Route
Existing Infrastructure
Multi Use Trail
Bike Lane
Neighborway
0 0.75 1.5 3
1:160,000
mi
N
39
Muncie Bike Implementation Plan 2017-2021

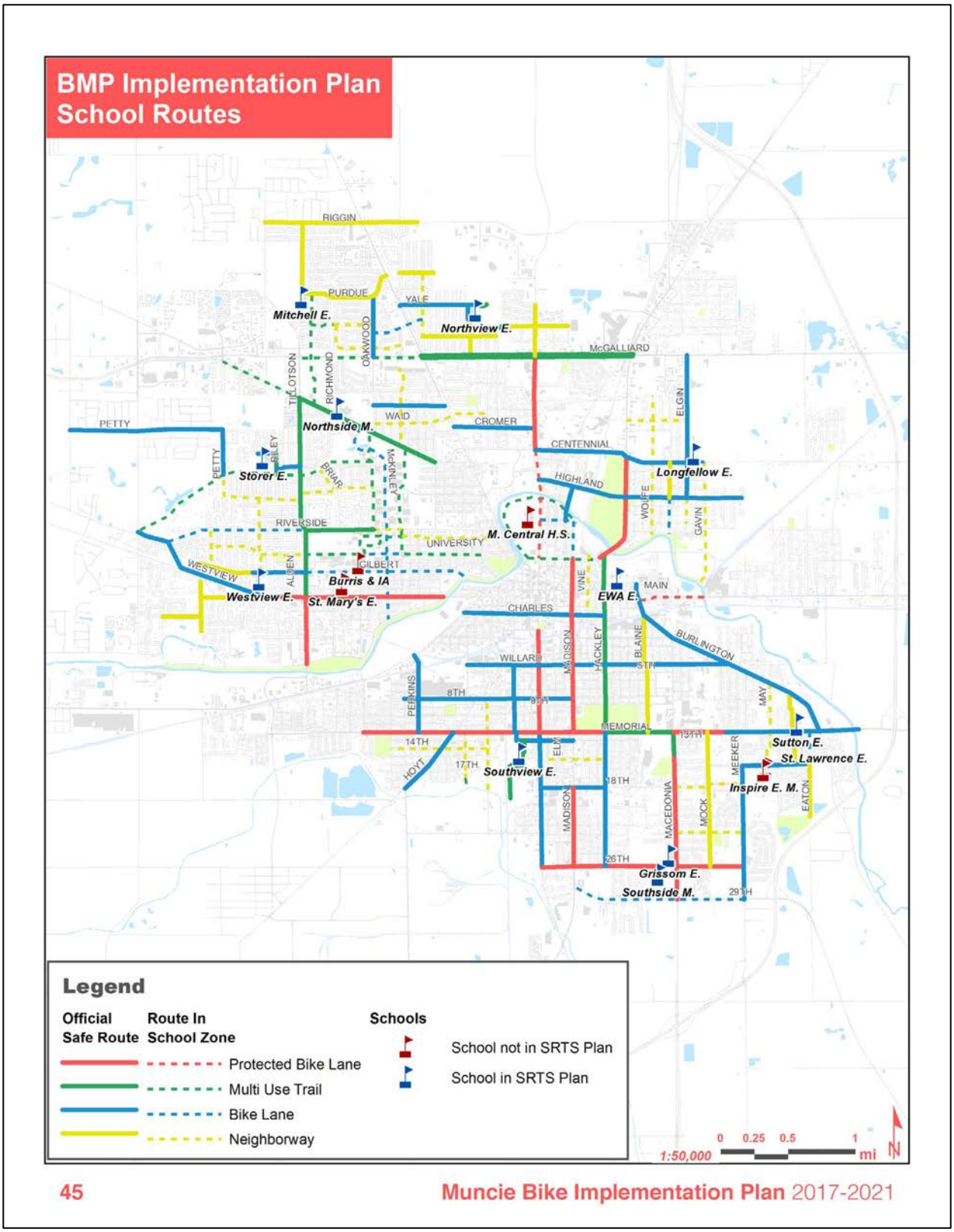

BMP Implementation Plan
Tier 1 Priority Projects
McGalliard E
Centennial
Dr MLK Jr
Highland
Jackson
Willard
8th St
Madison
MACT
Memorial
Memorial
Legend
Existing Planned
Protected Bike Lane
Multi Use Trail
Bike Lane
0 0.25 0.5 1
mi
1:50,000
N
40

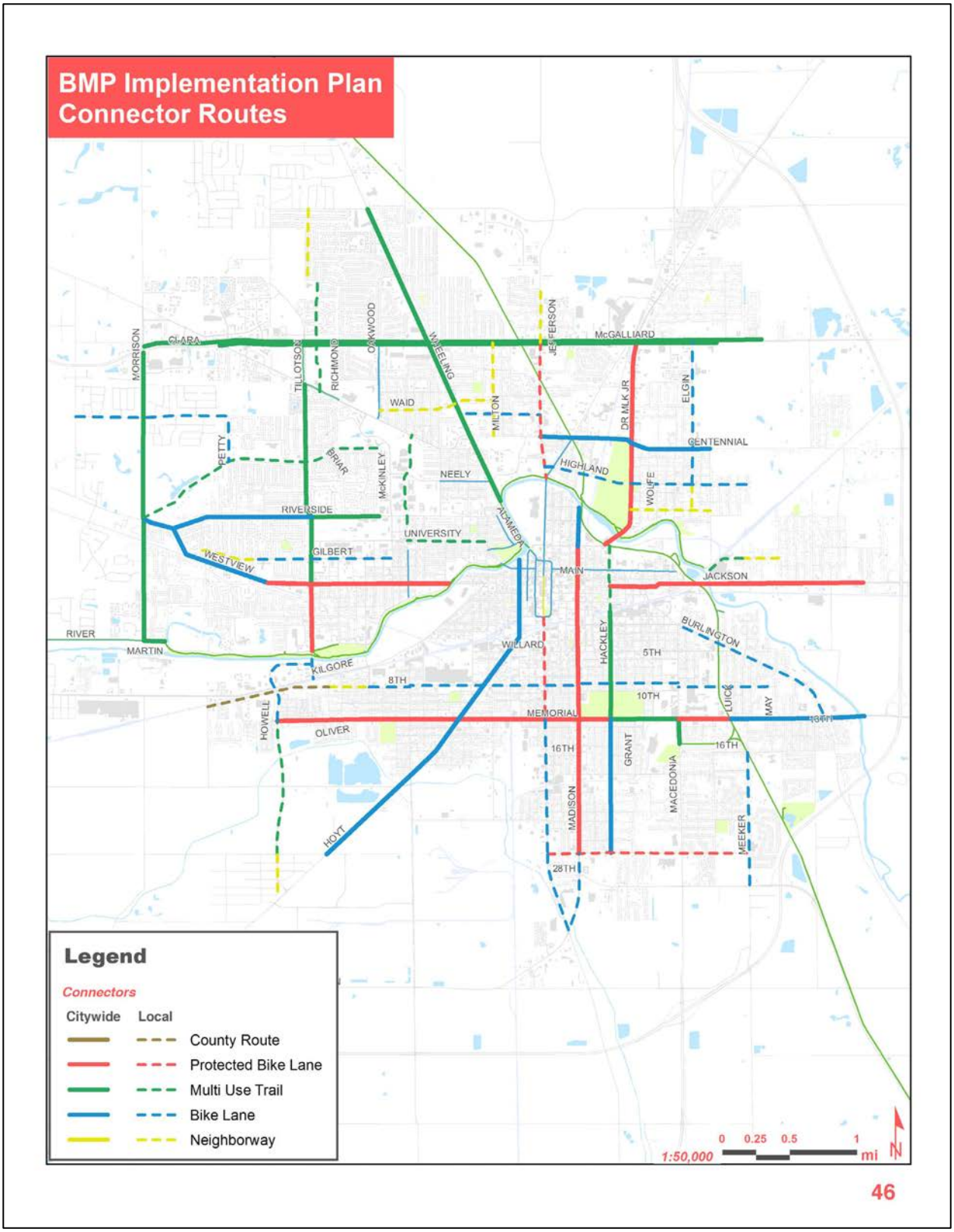

BMP Implementation Plan
Tier 2 Priority Projects
Tillotson
Schneider GW
Harvard
McGalliard E
Petty
Tillotson
Riverside
Jackson
Dr MLK Jr
Waid
Elgin
Wolfe
Macedonia
Gavin
Madison
MACT
Charles
Ohio
Willard
Liberty
Blaine
Memorial
Hoyt
Memorial
Madison
Hackley
Eaton
Legend
Existing Planned
Protected Bike Lane
Multi Use Trail
Bike Lane
Neighborway
Tier1
0 0.25 0.5 1
1:50,000
mi
N
41
Muncie Bike Implementation Plan 2017-2021

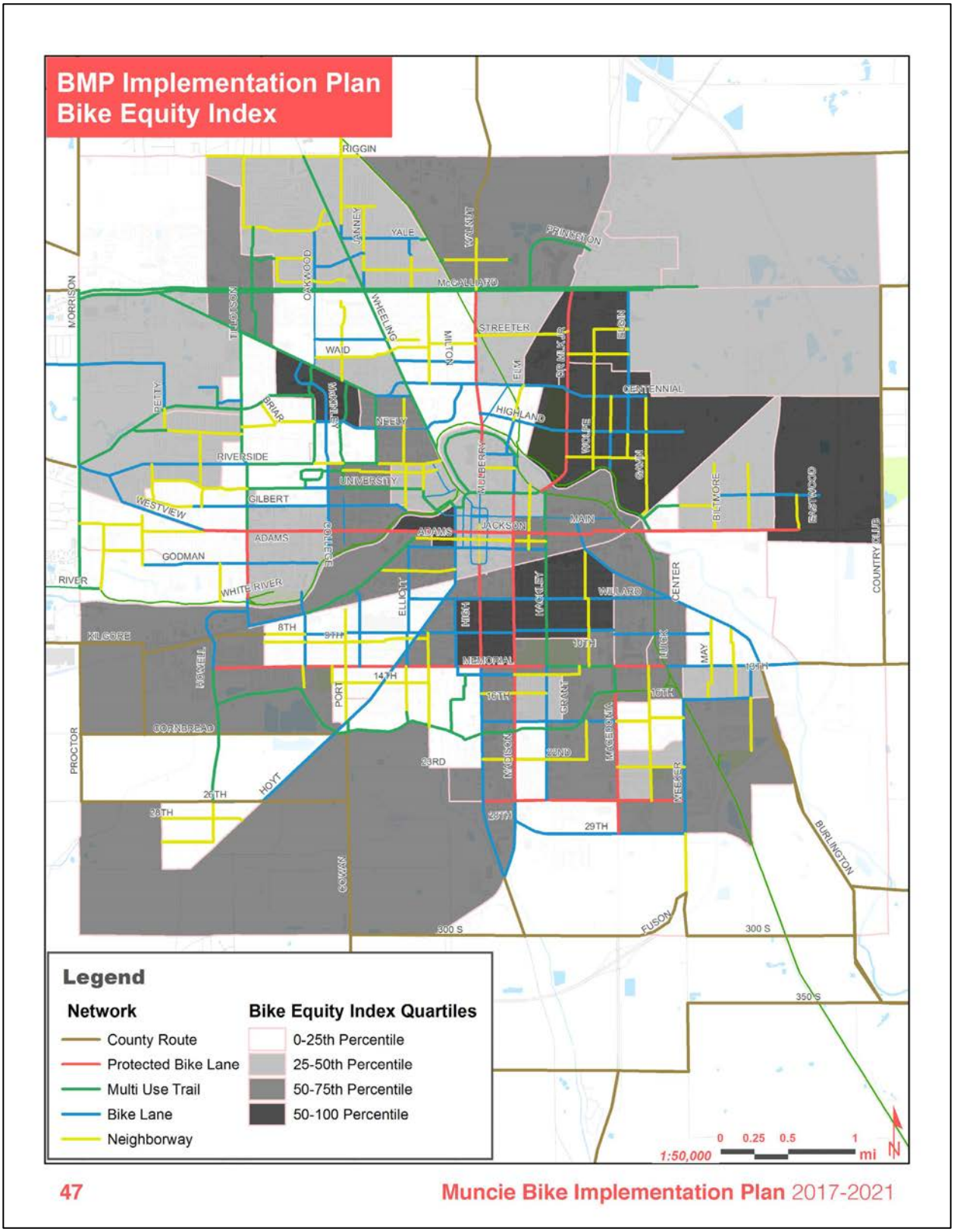

BMP Implementation Plan
Tier 3 Priority Projects
Riggin
Purdue
Wheeling
Yale
Berkeley
McGalliard E
McGalliard W
Streeter
Cowing
Cromer
Walnut
Bethel
Morrison
Cardinal Creek Trail
East Quad Path
Highland
Elm
Lowell
Riverside
MACT
Gilbert
Gilbert
McKinley
Woodway
Stradling
Liberty
Jackson
Mangrove
Burlington
Tillotson
Tillotson Overpass
Perkins
8th St
8th St
Sutton Neighborway
13th
16th
18th
Walnut St
Macedonia
Mock
Meeker
26th
28th
Walnut
Legend
Existing Planned
Protected Bike Lane
Multi Use Trail
Bike Lane
Neighborway
Tiers 1 & 2
0 0.25 0.5 1
1:50,000
mi
N
42

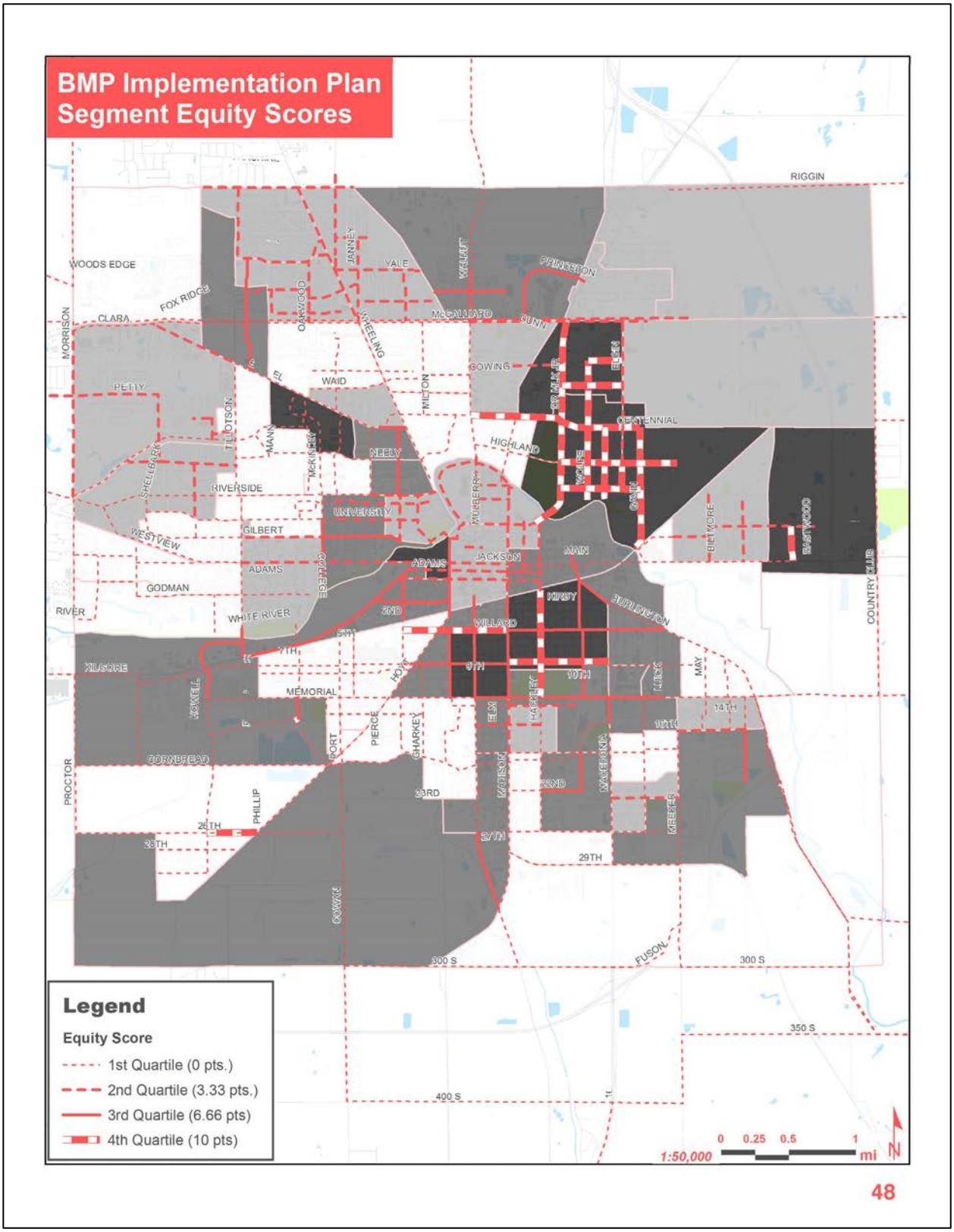

BMP Implementation Plan
Tier 4 Priority Projects
Norwood
Janey
Barr
Mcgalliard W
McGalliard E
McGalliard W
Bethel
Wheeling
Streeter
Waid
Bethel
Briar
Cowpath
McKinley
Linden
Central
Levee GW
Petty
Riverside
Beechwood
Walnut
Myrtle
McKenzie
University
MACT
University
MACT
Vine
North
Wysor
Morrison
Jackson
Adams
Jackson
Powers
Mini Gap
Kilgore
Hoyt
8th St
May
Memorial
Batavia
Tillotson
14th
Elliott
Gharkey
13th
15th
Eaton
18th
22nd
23rd
Hoyt
Madison
29th
Legend
Existing Planned
Protected Bike Lane
Multi Use Trail
Bike Lane
Neighborway
Tiers 1-3
0 0.25 0.5 1
1:50,000
mi
N
43
Muncie Bike Implementation Plan 2017-2021

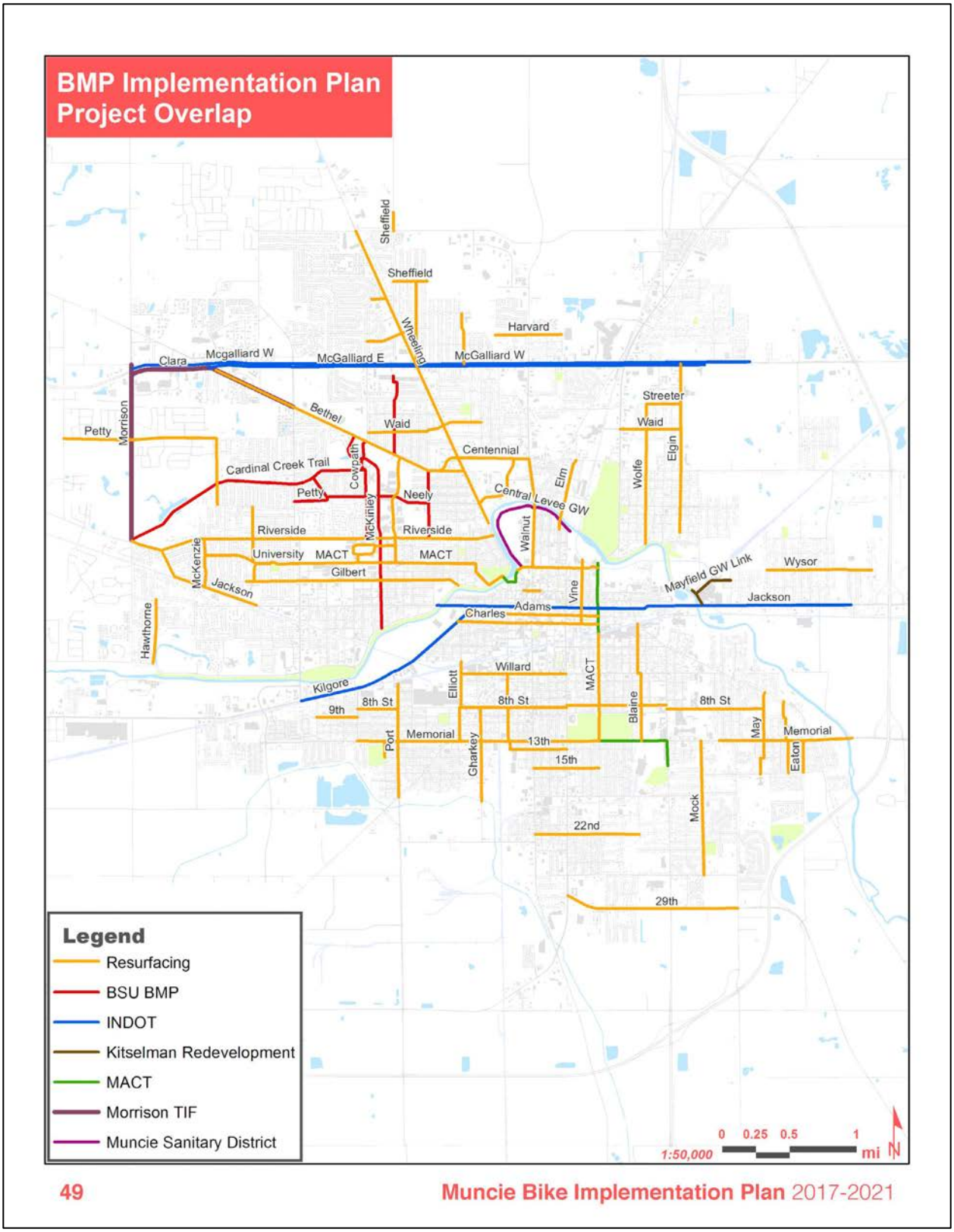

BMP Implementation Plan
Tier 5 Priority Projects
Selma Routes
Rosewood
Janney
Morrison TIF project
Reserve
Centennial
Elm
Neely
Petty Trailhead
Riverside
Linden
MACP
Manhattan
Claypool
Garvery
Hawthorne
Godman
Umbarger
Elliott
8th
9th
8th St
Port
Memorial
Kilgore Perdieu
Cornbread
Ball Greenway
18th
22nd
Daleville Routes
28th
31st
Meeker
Burlington
Walnut
Reservoir Routes
Legend
Existing Planned
County Route
Multi Use Trail
Bike Lane
Neighborway
Tiers 1-4
0 0.25 0.5 1
mi
1:50,000
N
44


BMP Implementation Plan
School Routes
RIGGIN
PURDUE
YALE
Mitchell E.
Northview E.
McGALLIARD
OAKWOOD
TILOTSON
RICHMOND
ELGIN
PETTY
WAID
CROMER
Northside M.
CENTENNIAL
Longfellow E.
HIGHLAND
WOLFE
GAVIN
McKINLEY
BRIAR
RILEY
Storer E.
RIVERSIDE
UNIVERSITY
M. Central H.S.
GILBERT
WESTVIEW
ALDEN
Burris & IA
Westview E.
St. Mary's E.
VINE
EWA E.
MAIN
CHARLES
BURLINGTON
MADISON
HACKLEY
BLAINE
WILLARD
5TH
PERKINS
8TH
9TH
MAY
MEMORIAL
13TH
14TH
ELM
Sutton E.
St. Lawrence E.
HOYT
17TH
Southview E.
18TH
MEEKER
Inspire E. M.
EATON
MADISON
MACEDONIA
MOCK
26TH
Grissom E.
Southside M.
29TH
Legend
Official Safe Route
Route In School Zone
Protected Bike Lane
Multi Use Trail
Bike Lane
Neighborway
Schools
School not in SRTS Plan
School in SRTS Plan
1:50,000
0 0.25 0.5 1 mi
N


BMP Implementation Plan
Connector Routes
CLARA
MORRISON
TILLOTSON
RICHMOND
OAKWOOD
WHEELING
JEFFERSON
McGALLIARD
WAID
MILTON
DR MLK JR
ELGIN
CENTENNIAL
HIGHLAND
WOLFE
PETTY
BRIAR
McKINLEY
NEELY
RIVERSIDE
UNIVERSITY
ALAMEDA
WESTVIEW
GILBERT
MAIN
JACKSON
RIVER
MARTIN
WILLARD
HACKLEY
5TH
BURLINGTON
KILGORE
8TH
10TH
LUICK
MAY
HOWELL
MEMORIAL
OLIVER
16TH
GRANT
MACEDONIA
MADISON
MEEKER
HOYT
28TH
Legend
Connectors
Citywide
Local
County Route
Protected Bike Lane
Multi Use Trail
Bike Lane
Neighborway
0 0.25 0.5 1
mi
1:50,000
N
46


BMP Implementation Plan
Bike Equity Index
RIGGIN
YALE
JANNEY
WILKEY
PRINCETON
McGALLIARD
MORRISON
OAKWOOD
WHEELING
STREETER
MILTON
WAID
ELM
ELSON
CENTENNIAL
HIGHLAND
BETTY
BRIAR
NEELY
RIVERSIDE
UNIVERSITY
GILBERT
WESTVIEW
ADAMS
JACKSON
MAIN
GODMAN
RIVER
WHITE RIVER
ELLIOTT
WILLARD
CENTER
KILGORE
8TH
9TH
10TH
MEMORIAL
MAY
14TH
16TH
18TH
CORNBREAD
PROCTOR
HOYT
23RD
26TH
28TH
29TH
300 S
FUSON
350 S
BURLINGTON
COUNTRY CLUB
EASTWOOD
BILTMORE
Legend
Network
County Route
Protected Bike Lane
Multi Use Trail
Bike Lane
Neighborway
Bike Equity Index Quartiles
0-25th Percentile
25-50th Percentile
50-75th Percentile
50-100 Percentile
0 0.25 0.5 1
mi
1:50,000
N
47
Muncie Bike Implementation Plan 2017-2021


BMP Implementation Plan
Segment Equity Scores
RIGGIN
WOODS EDGE
YALE
WALNUT
PRINCETON
CLARA
FOX RIDGE
OAKWOOD
JANNEY
WHEELING
McCALLIARD
DUNN
MORRISON
PETTY
WAID
GOWING
MILTON
CENTENNIAL
HIGHLAND
NEELY
RIVERSIDE
UNIVERSITY
GILBERT
WESTVIEW
ADAMS
JACKSON
MAIN
GODMAN
RIVER
WHITE RIVER
WILLARD
KILGORE
MEMORIAL
CORNBREAD
PROCTOR
PHILLIP
26TH
28TH
23RD
29TH
300 S
350 S
400 S
FUSON
Legend
Equity Score
1st Quartile (0 pts.)
2nd Quartile (3.33 pts.)
3rd Quartile (6.66 pts)
4th Quartile (10 pts)
1:50,000
0 0.25 0.5 1
mi
N
48


BMP Implementation Plan
Project Overlap
Sheffield
Sheffield
Wheeling
Harvard
Clara
Mcgalliard W
McGalliard E
McGalliard W
Streeter
Bethel
Waid
Waid
Petty
Morrison
Centennial
Elgin
Cardinal Creek Trail
Cowpath
Elm
Wolfe
Petty
McKinley
Neely
Central
Levee GW
Riverside
Riverside
Walnut
McKenzie
University
MACT
MACT
Gilbert
Mayfield GW Link
Wysor
Jackson
Jackson
Vine
Adams
Charles
Hawthorne
Willard
MACT
Kilgore
Elliott
8th St
8th St
8th St
9th
Blaine
May
Memorial
Port
Memorial
13th
Eaton
Gharkey
15th
Mock
22nd
29th
Legend
Resurfacing
BSU BMP
INDOT
Kitselman Redevelopment
MACT
Morrison TIF
Muncie Sanitary District
0 0.25 0.5 1
mi
1:50,000
N
49
Muncie Bike Implementation Plan 2017-2021

REFERENCES & RESOURCES

Statewide Pedestrian and Bicycle Planning Handbook. Report no. DOT- VNTSC-FHWA-14-04, FHWA-HEP-14-035. Washington DC: U.S. Department of Transportation, Federal Highway Administration, Office of Planning, 2014. https://www.fhwa.dot.gov/planning/processes/pedestrian_bicycle/publications/pedestrian_bicycle_handbook/fhwahep14051.pdf?redirect.

Orcutt, Jon. *Quick Builds For Better Streets: A New Project Delivery Model For U.S. Cities*. Boulder, CO: PeopleForBikes, Green Lane Project, 2016. https://nacto.org/wp-content/uploads/2016/05/2016PeoplefoBikes_Quick-Builds-for-Better-Streets.pdf.

Prelog, Rachael. *Equity of Access to Bicycle Infrastructure: GIS Methods for Investigating the Equity of Access to Bike Infrastructure*. League of American Bicyclists, 2015. http://bikeleague.org/sites/default/files/bike_equity_index_final_web.pdf

Glossary of Terms

Planning, as a field, involves its own lexicon that may be confusing to the uninitiated. Bicycle planning, unfortunately, is no exception. While the author has attempted to explain concepts in this document without the use of overly technical language, several specialized terms require elaboration. Below is a glossary of terms used in this document, as defined by the author.

Bike Route - Generally placed on streets with lower automobile traffic, bike routes are signed and designated routes that are perceived to be safer or more convenient for cyclists. While a bike route may be a street with or without on-street improvements such as bike lanes or cycle tracks, they generally consist of unimproved streets with a signage that indicates the street is a preferred bike route.

Bikeway - Any facility designed with some level of accommodation for bicycles. This may range from a signed bike route with no on-street improvements, to a striped bike lane, to an off-street multi-use trail.

Buffered Bike Lane - An on-street bike lane that includes an additional buffered space. The buffered space is generally placed between the bike lane and parking lane, or the bike lane and drive lane, depending on the types of crashes and close calls reported along that street.

County Route - Similar to a bike route, a county route is a rural roadway used by recreational or sport cyclists for training or exercise. County routes differ from bike routes in that they may not connect to common destinations in the town's core or neighborhoods, may not be low-traffic,

and may not include adequate space for cyclists in the roadway shoulder. These routes are generally identified by local cycling clubs, and are largely signed in order to alert motorists of the likely presence of cyclists.

Cycle Track - A two-way, on-street bike lane placed one side of the street. Often protected by a curb or parallel parked cars, a cycle track differs from a multi-use trail in that it is developed in the roadway.

Low-stress Facility or Network - While experienced or confident cyclists may feel comfortable riding in a roadway with no improvements for bicycles, a small child or family likely would not. A low facility is a facility where families with children will likely feel safe or comfortable cycling. A low-stress network is an entire network of such facilities, and is increasingly becoming the goal of many communities.

Multi-use Trail - An off-street trail that allows two-way traffic of bicycles, pedestrians, and often other types of users as well. Multi-use trails are often paved or bricked, but may also consist of natural materials like dirt, compacted limestone, or crushed granite.

Neighborway - Also referred to as a bicycle boulevard, a neighborway is a signed bike route on a neighborhood street that includes traffic calming treatments. While cyclists in neighbor ways generally share the lane with automobiles, the street may include improvements such as shadows, speed bumps, landscaping, or an artificial pinch point (also called a chicane) in order to calm automobile traffic to a similar speed as bicycle traffic.

Project delivery model - A flow-chart or list of steps, describing a process for moving a project from concept to construction.

Protected Bike Lane - An on-street bike lane with some level of physical barrier between the cyclists and motor traffic. This barrier may consist of low cost or temporary materials such as bollards, flex posts, or planter boxes, but are preferably protected by a permanent curb or parked cars. Increasingly, bike lanes are protected by raising the grad of the entire lane to either just below or at sidewalk level.

Quick Build - A method for incrementally building and upgrading bicycle and pedestrian infrastructure, starting with quickly building out a project using low cost or often temporary materials. An example of a quick build project is building a buffered bike lane with paint only, with the intent of eventually converting the facility to a curb protected bike lane.

Sharrow - A portmanteau of shared road, a sharrow is a painted street marking that alerts drivers of the likely presence of cyclists in the lane. Sharrows are also designed to be placed in the road more than three feet away from parked cars, encouraging cyclists to ride outside of the door zone.

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Image 1 – Elliott Street Before Resurfacing
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Image 2 – Oakwood Avenue Bike Lane Striping Updates
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Image 3 – RoadMap Cover
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Image 4 – Resurfacing Guide Cover
Incorporating On-Road Bicycle Networks into Resurfacing Projects. Report no. FHWA-HEP-16-025. Washington DC: U.S. Department of Transportation, Federal Highway Administration, 2016. Document cover image. https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/resurfacing/resurfacing_workbook.pdf.

Image 5 – Complete Streets Guide Cover
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Image 6 – Quick Builds Cover

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Image 7 - 300 South Quick Build Protected Bike Lane, Salt Lake City, Utah
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Image 10 – Toilet Plunger Bollards on 63rd and Shirley Streets, Omaha, Nebraska
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Image 11 - Project Delivery Model for Louisville, Kentucky
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Images 12-17 – Selected Maps and Images from Author's Creative Project
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